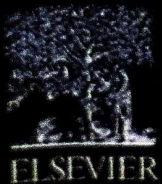
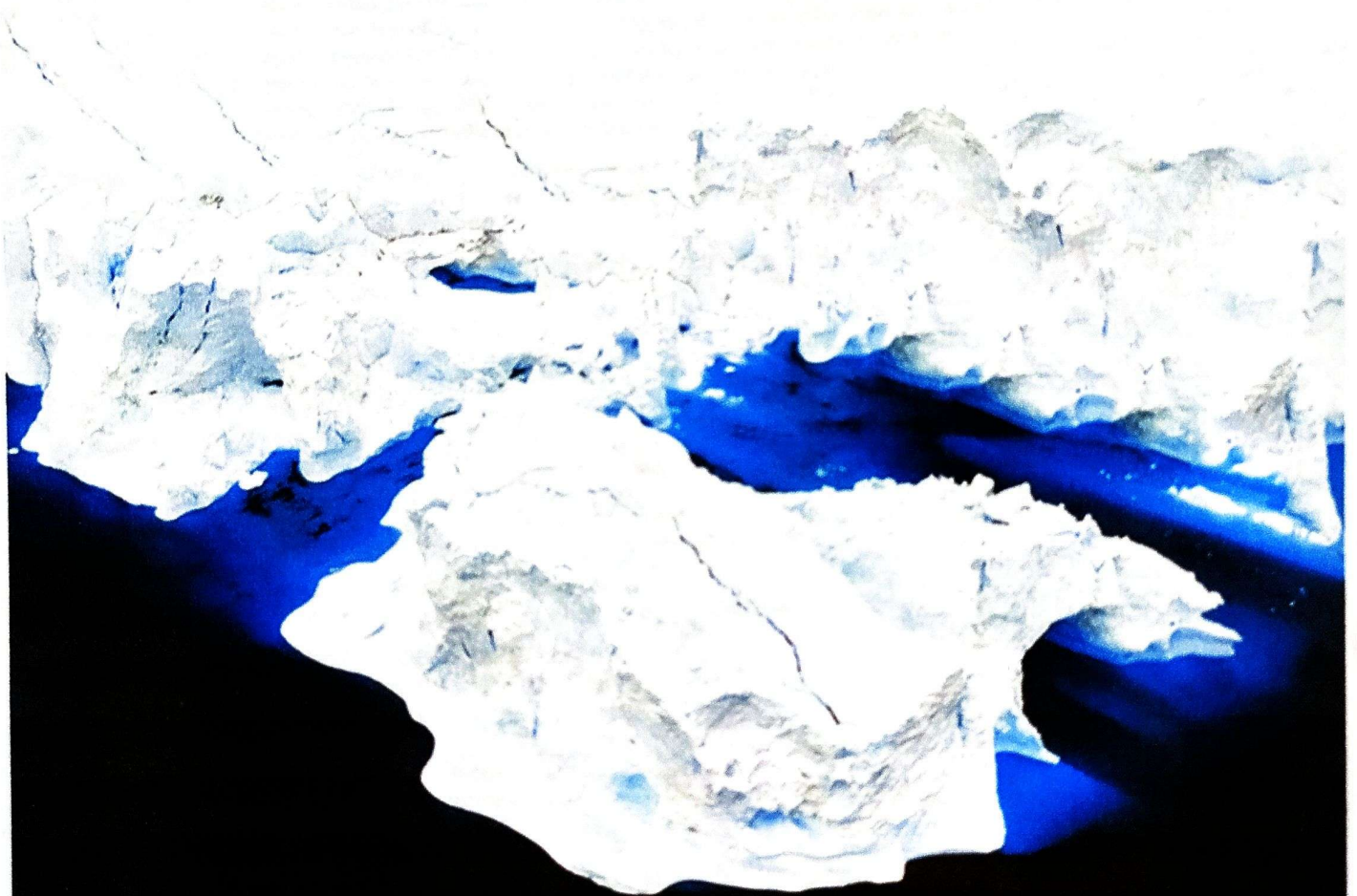


# UNDERSTANDING PRESENT AND PAST ARCTIC ENVIRONMENTS

AN INTEGRATED APPROACH FROM CLIMATE CHANGE PERSPECTIVES



Edited by

**Neloy Khare**

**Elsevier**

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## Measurements of carbon monoxide at Polar regions

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### 17.1 Introduction

Carbon monoxide (CO) is a chemically important gas in the atmosphere. It is mainly removed from the atmosphere by reaction with hydroxyl radical (OH) (Thompson, 1992). Information about concentrations of OH radical and other trace gases (e.g., ozone, CO, nitrogen oxides, and formaldehyde) help to provide a better understanding of the chemistry of the atmosphere. Carbon monoxide, as a major sink of OH radical, controls the lifetime of many gases which are relevant for climate change studies (Logan et al., 1981; Crutzen, 1995). As a result, CO distribution and trend should influence OH concentration and act in a significant manner on the oxidation capacity of the atmosphere. Therefore an anthropogenic or natural disturbance in the CO concentration could perturb OH concentration and have a significant impact on many aspects of atmospheric chemistry (Thompson and Ciccone, 1986; Khalil and Rasmussen, 1990).

The global budget of atmospheric CO is moderately estimated (Seiler and Conrad, 1987; Crutzen, 1995; Houghton et al., 1995; Holloway et al., 2000); however, it is uncertain. It is generally believed that atmospheric CO comes from fossil fuel combustion, biomass burning, and gas-phase oxidation of natural hydrocarbon (McConnell et al., 1971; Erickson, 1989; Khalil and Rasmussen, 1990). However, there is lack of information about the CO production and distribution processes. Measurements have shown that natural dissolved organic matter (DOM) in lake, wetland, surface marine and fresh water, and rain water leads to

# Nonlinear Radiative Williamson Fluid Against a Wedge with Aligned Magnetic Field



K. Subbarayudu, L. Wahidunnisa, S. Suneetha, and P. Bala Anki Reddy

**Abstract** The foremost importance of this presentation is to explore the nonlinear thermal radiation on a Williamson liquid model on a wedge in the company of a heat generation/absorption which is not uniform. An aligned magnetic field, Brownian diffusion and thermophoresis aspects are also investigated. The flow and temperature equations are derived and solved by Runge–Kutta based *MATLAB bvp4c solver*. Results for different flow characteristics are plotted through graphs and discussed in detail. The wall temperature raises as temperature ratio parameter increases and results in a deep penetration for temperature. The concentration of the species seems to be increased with Brownian diffusion and radiation.

**Keywords** Williamson fluid model · Wedge shape geometry · Aligned magnetic field · Nonlinear thermal radiation

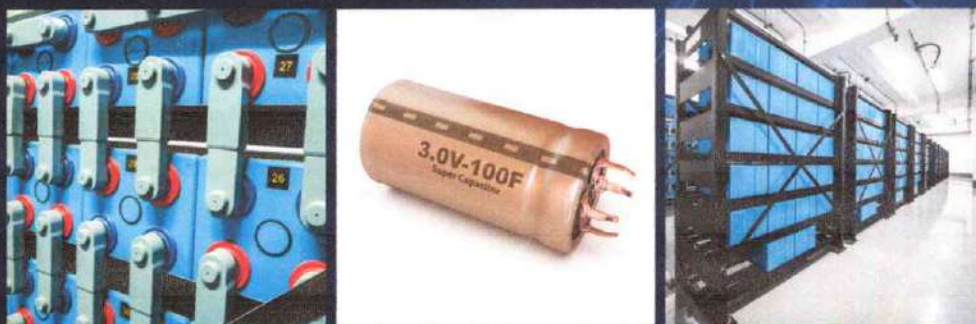
## 1 Introduction

The contemporary era, researchers are doing many experimental and theoretical studies on the fluid flow and transformation of energy in the non-Newtonian fluid models that have significant applications in engineering, for instance, emulsions, lubricants, polymers, and nuclear fuel slurries. Some alive rheological models are Power law, Carreau, Jeffery, Williamson fluid, and so forth. Out of these, Williamson fluid model is a simple model to suggest the viscoelastic nature and shear thin out features which were introduced by Williamson [1] in 1929. The fluid flow and transfer of heat across wedge-shaped geometries are important in several engineering applications and also in fluid dynamics. Particularly such flows occur in aerodynamics, heat exchangers, geothermal industries, and so on. A number of surveys have been found considering Williamson wedge flow in Ref. [2–4]. The study of fluid past a wedge with MHD has vital applications in nuclear reactor cooling, MHD power generators and

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# Oxide Free Nanomaterials for Energy Storage and Conversion Applications

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Abdullah M. Al-Mayouf, Myong Yong Choi  
and Madhavan Jagannathan



<b>14. Recent advances in nanostructured nonoxide materials—Borides, borates, chalcogenides, phosphides, phosphates, nitrides, carbides, alloys, and metal-organic frameworks</b>	
<i>Leticia S. Bezerra, Bibiana K. Martini, Eduardo S.F. Cardoso, Guilherme V. Fortunato, and Gilberto Maia</i>	
1. Introduction	329
2. Existing technology	330
2.1 Alkaline electrolysis cell	331
2.2 Proton exchange membrane electrolysis cell	331
2.3 Solid oxide electrolysis cell	331
3. Methodology or research design to overcome the drawbacks of existing protocols	331
3.1 Borides	332
3.2 Borates	332
3.3 Chalcogenides (sulfides and selenides)	333
3.4 Phosphides	334
3.5 Phosphates	335
3.6 Nitrides	336
3.7 Carbides	337
3.8 Alloys	338
3.9 MOFs	339
4. Findings or results with implications for managers and decision-makers	341
5. Discussion, limitations, future research, and conclusion	350
References	353
<b>15. Oxides free nanomaterials for (photo) electrochemical water splitting</b>	
<i>Lakshmana Reddy Nagappagari, Santosh S. Patil, Kiyoung Lee, and Shankar Muthukonda Venkatakrishnan</i>	
1. General introduction	369
2. Metal nitrides	370
2.1 General synthesis methods of metal nitrides	372
2.2 Mono metal nitrides for PEC water splitting	373
2.3 Binary metal nitrides for PEC water splitting	374
3. Metal phosphides	378
3.1 Synthesis methods of metal phosphides	379
3.2 Mono metal phosphides for PEC water splitting	383
3.3 Binary metal phosphides for PEC water splitting	383
4. Metal sulfides	386
4.1 Synthesis methods of metal sulfides	386
4.2 Mono metal sulfides for PEC water splitting	391
4.3 Binary metal sulfides for PEC water splitting	391

## Chapter 15

# Oxides free nanomaterials for (photo)electrochemical water splitting

Lakshmana Reddy Nagappagari<sup>a,b</sup>, Santosh S. Patil<sup>a,b</sup>, Kiyoun Lee<sup>a,b</sup>, and Shankar Muthukonda Venkatakrisnan<sup>c</sup>

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### Chapter outline

<b>1. General introduction</b>	<b>369</b>	3.3 Binary metal phosphides for PEC water splitting	383
<b>2. Metal nitrides</b>	<b>370</b>	<b>4. Metal sulfides</b>	<b>386</b>
2.1 General synthesis methods of metal nitrides	372	4.1 Synthesis methods of metal sulfides	386
2.2 Mono metal nitrides for PEC water splitting	373	4.2 Mono metal sulfides for PEC water splitting	391
2.3 Binary metal nitrides for PEC water splitting	374	4.3 Binary metal sulfides for PEC water splitting	391
<b>3. Metal phosphides</b>	<b>378</b>	<b>5. Summary and future prospects</b>	<b>393</b>
3.1 Synthesis methods of metal phosphides	379	<b>Acknowledgment</b>	<b>396</b>
3.2 Mono metal phosphides for PEC water splitting	383	<b>References</b>	<b>396</b>

### 1. General introduction

Owing to the rapid end of fossil fuels and environmental threats, the development of clean and renewable alternatives to fossil fuels has become an important task. Among the various energy sources, hydrogen (H<sub>2</sub>) has attracted significant attention because of its high gravimetric energy density beyond that of known fuels, compatibility with electrochemical processes, and energy

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# తిలక్ సాహిత్యం - సందేశం

(శతజయంతి సప్తాహం - అంతర్జాతీయ సదస్సు వ్యాసాలు)



యోగివేమన విశ్వవిద్యాలయం, కడప  
మరియు



ఆంధ్రప్రదేశ్ ఉన్నత విద్యామండలి, అమరావతి

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## విషయ సూచిక

- |    |  |      |
|----|--|------|
| 1) | భావాభ్యుదయ కవి తిలక్<br>ఆచార్య హేమచంద్రారెడ్డి, ఛైర్మన్<br>ఆంధ్రప్రదేశ్ ఉన్నత విద్యామండలి, అమరావతి           | iii  |
| 2) | విశిష్ట సృజనకారుడు తిలక్<br>ఆచార్య ఎం. సూర్యకళావతి, ఉపకులపతి<br>యోగివేమన విశ్వవిద్యాలయం, కడప                 | vii  |
| 3) | ఆర్తుల పక్షపాతి తిలక్<br>ఆచార్య సుధీర్ ప్రేమ్ కుమార్, కార్యదర్శి<br>ఆంధ్రప్రదేశ్ ఉన్నత విద్యామండలి, అమరావతి  | ix   |
| 4) | సందేశాత్మక సాహిత్యాన్ని కాపాడుకోవాలి<br>ఆచార్య విజయరాఘవప్రసాద్, రిజిస్ట్రార్<br>యోగివేమన విశ్వవిద్యాలయం, కడప | xiii |
| 1. | నూరేళ్ళ తిలక్ ఈనాటి మనం<br>- ఆచార్య రాచపాళెం చంద్రశేఖరరెడ్డి   | 1    |
| 2. | రనచలో అనుభవ సాంద్రత సాధించిన కవి తిలక్<br>- ఆర్వీయస్. సుందరం   | 6    |
| 3. | మానవతావాదం - తిలక్ కవిత్వం<br>- ఆచార్య మేడిపల్లి రవికుమార్   | 9    |
| 4. | తిలక్ కథలు - వస్తు విశ్లేషణ<br>- ఆచార్య కె. ఆశాజ్యోతి  | 17   |
| 5. | దేవరకొండ బాలగంగాధర తిలక్ కథలు-మనస్తత్వ విశ్లేషణ<br>- ఆచార్య కొలకలూరి మధుజ్యోతి                               | 27   |
| 6. | తపాలాబంట్లోతు-తిలక్ సామాజిక దృక్పథం<br>- ఆచార్య ఎం. రామనాథం నాయుడు   | 39   |

7. తిలక్ కవిత్వతత్వం 46  
- ఆచార్య దార్ల వెంకటేశ్వరరావు
8. తిలక్ కథల్లో స్త్రీపురుష సంబంధాలు 55  
- ఆచార్య కిన్నెర శ్రీదేవి
9. తిలక్ కవిత - నవ్యత 62  
- ఆచార్య ఎన్.వి. కృష్ణారావు
10. తిలక్ కవిత్వం - అలంకార వైవిధ్యం 81  
- ఆచార్య పి.ఆర్. హరినాథ్
11. తిలక్ "అమృతం కురిసిన రాత్రి"-వస్తువిశ్లేషణ 85  
- ఆచార్య విస్తాలి శంకరరావు
12. దేవరకొండ బాలగంగాధర తిలక్ సాహిత్యంపై 99  
పాశ్చాత్య ప్రభావం : ఒక విశ్లేషణ  
- ఆచార్య పి. పద్మ
13. తిలక్ కథలు - మానవీయత 119  
- డా॥ ఎల్. విజయ కృష్ణారెడ్డి
14. నవనవాలైన ఊహావర్ణనలమీద 125  
ఉదయించిన సూర్యుడు తిలక్  
- డాక్టర్ వైదేహి శశిధర్, M.D.
15. తిలక్ కథలు - పాత్రచిత్రణ 132  
- డా॥ పాలెం రమాదేవి
16. తిలక్ నాటికలు - సామాజిక నేపథ్యం 139  
- డా॥ మూల మల్లికార్జునరెడ్డి
17. తిలక్ నాటికలు - వస్తు విశ్లేషణ 144  
- డా॥ జి. పార్వతి
18. తిలక్ "అమృతం కురిసిన రాత్రి" అనుభూతి-అభివ్యక్తి 151  
- డా॥ పి. విజయకుమార్

19.	సాలెగూడు సామాజిక గోడు - డా॥ డి. నల్లన్న	169
20.	తిలక్ రచనలు - ఏకపాత్ర - డా॥ తోట వెంకటస్వామి	174
21.	తిలక్ వ్యాసాలు - సాహిత్య సైద్ధాంతిక ప్రతిపాదనలు - డా॥ డి. రాజశేఖర్	178
22.	తిలక్ లేఖా సాహిత్యం - ఎ. రాజయ్య	188
23.	సౌందర్యానికి నిలువెత్తు నిదర్శనం తిలక్ కవిత్వం - ఎస్.పి. యూసుఫ్, ఎం.సి.జె.	197
24.	తిలక్ కథలు - కవిత్వాక శైలి - డా॥ వినోద్దిని మదాసు	204
25.	తిలక్ కథలు-శిల్పసౌందర్యం - డా॥ పి.సి. వెంకటేశ్వర్లు	208
26.	తిలక్ సాహిత్యం - సందేశం - డా॥ ఎన్. ఈశ్వరరెడ్డి	224

ఈ పుస్తకంలో ఉన్న వ్యాసాలలోని అభిప్రాయాలు ఆయా వ్యాసకర్తలవే.

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## 12. దేవరకొండ బాలగంగాధర తిలక్

### సాహిత్యంపై ప్రాశ్చాత్య ప్రభావం : ఒక విశ్లేషణ

- ఆచార్య పి.పద్మ

ఆధునికం (modern) అనగానే ప్రాశ్చాత్య (Western) పదంగా గ్రహించి అంతగా ప్రాశ్చాత్య ప్రభావం ఇరవై శతాబ్దంలో భారతీయ సాహిత్యంపై పడింది. ఈ పదం సాహిత్యంతోపాటు జీవన విధానానికి కూడా వర్తిస్తుంది. ఆధునిక కవిత్వం లక్షణాలు శతాబ్దాల మునుపే తెలుగు కవైన వేమన, పొంది కవులైన కటిక, గురజాడ వంటి వారి పద్యాలలో కనిపించినప్పటికీ బ్రిటీష్ వారి పరిపాలనా కాలంలో ఆ లక్షణాలు ఎక్కువగా సమాజంలోనూ, రచనలలోనూ ప్రాముఖ్యత పొంది ప్రచారంలోకి వచ్చింది. కృష్ణశాస్త్రి, శ్రీశ్రీ, తిలక్ ఆధునిక ఆంధ్ర కవిత్వాన్ని మలుపు తిప్పిన నాయకులు. దేవరకొండ బాలగంగాధర్ తిలక్ (1921-1966) రాసిన భావ కవిత్వం (1935-1946) అభ్యుదయ కవిత్వం (1954-1966) ఆధునిక యుగంలో పచ్చనపి కావున తిలక్ పైన ప్రాశ్చాత్య ప్రభావం ప్రత్యక్షంగా, పరోక్షంగా ఎలా పడిందో ఈ పత్రంలో క్లుప్తంగా పరిశీలించబడినది. తిలక్ కథలు, నాటికలు, లేఖలు, అధునిక వ్యాసాలు రచించినప్పటికీ తనకు బాగా పేరు తెచ్చిపెట్టినది, అతని చురణాసంతరం సాహిత్య అకాడమీ వారు ప్రచురించిన వచన కవితా సంపుటి అమృతం కురిసిన రాత్రి (1968). ప్రస్తుత పత్రంలో విశ్లేషించిన అంశాలు అందులోని కొన్ని కవితలపై కేంద్రీకృతమైనవి. బ్రిటీష్ పరిపాలనా సమయంలో భారతదేశంలో వచ్చిన మార్పులు, 20వ శతాబ్దంలో ప్రపంచంలో వచ్చిన మార్పులు తిలక్ ని ఎలా ప్రభావితం చేశాయో, తిలక్ సాహిత్యంపై కన్పించిన ప్రాశ్చాత్య ప్రభావం వివిధ రూపాలలో - పదాలు, పదబంధాలు (Words and phrases), స్వీకరణ (adoption), ప్రభావం (influence), అనుకరణ (imitation), అనువాదం (translation and trans-creation), చివరగా (inter-textuality) కనిపించేవి వాటిని ఈ పత్రంలో క్లుప్తంగా విశ్లేషించబడినది.

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## 15. తిలక్ కథలు - పాత్రచిత్రణ

- డా॥ పాలెం రమాదేవి

దేవరకొండ బాలగంగాధర తిలక్ కవిత్యంతో పాటు కథలు, నాటకాలు, నాటికలు, లేఖలు, లఘు వ్యాసాలు రచించాడు. తిలక్ తన కవిత్యం ద్వారా పాఠకుల్ని ఎంత మెప్పించాడో కథల ద్వారా కూడా అంతే మెప్పించాడు. పరిపక్వత, నిపుణత, సంపూర్ణత ఈ మూడు పుష్పలంగా ఉన్న కథకుడు తిలక్ అని విమర్శకుల అభిప్రాయం. తిలక్ తన కథల ద్వారా సమాజంలో మృగ్యమైపోతున్న మానవతా విలువల్ని, మనిషిలోని దురాశ, మోసం, స్వార్థం మొదలైన గుణాల్ని, సాంప్రదాయానికి మతానికి ఇచ్చిన ప్రాధాన్యం ఈ సమాజం మానవత్వానికి ఇవ్వడం లేదన్న సత్యాన్ని తెలియజేశాడు. సమకాలీన సమస్యలను కథల్లో ఎంతో ఉదాత్తంగా ప్రస్తావిస్తాడు.

కథకు శీర్షిక, ఎత్తుగడ, ముగింపు, సంభాషణలు ఎంత ముఖ్యమో పాత్రచిత్రణ కూడా అంతే ముఖ్యం. కథల్లో రెండు రకాలుంటాయి. 1) నిర్మాణం ప్రధానం నడిచే కథలు 2) పాత్రచిత్రణ మీద శ్రద్ధ పెట్టే కథలు. కథ ఈ రెండింటిలో ఏ కోవకు చెందినదైనా ఆ కథలో కొన్ని మానవ పాత్రలు ఉండడం తప్పనిసరి. మనుష్యుల సంతోషాలు, భయాలు, బాధలు, కోపాలు, పరాజయాలు, ఆశలు, అనుభూతులు, ఉద్వేగాలు, స్వార్థం మొదలైన లక్షణాలతో కూడిన పాత్రచిత్రణ పాఠకుల్ని ఆకట్టుకుంటుంది. కథకు మానవీయ కోణం అద్ది, పాఠకులను కథలో లీనమయ్యేలా చేసేవి అందులోని పాత్రలే.

పాత్ర చిత్రణకు రెండు పద్ధతులున్నాయి. ఒకటి కథకుడు తనకు తెలిసిన వ్యక్తుల ఆధారంగా పాత్రల్ని రూపొందించడం, రెండవది పూర్తిగా కథకుడి ఊహ నుండి పాత్రలను రూపొందించడం. వీటిలో ఏ పద్ధతి అవలంబించినా చివరికా పాత్ర ఎలా రూపొందిదన్నదే ముఖ్యం.

తిలక్ ఏ రచన తీసుకొన్నా మౌలికంగా ఆయన హృదయంలో, ఆలోచనలలో నిరంతరం స్రవించే కవితాధార అంతర్లీనంగా స్రవిస్తుంటుంది. తిలక్ కథలలో మంచి

## 16. తిలక్ నాటికలు - సామాజిక నేపథ్యం

- డా॥ మూల మల్లికార్జునరెడ్డి

దేవరకొండ బాలగంగాధర్ తిలక్ రూపొందించిన ఇరుగు-పొరుగు, పొగ అనే రెండు నాటికల గురించి సంక్షిప్తంగా విశ్లేషణ చేస్తాను. ఆయన సాలెగూడు, సుశీలపెళ్లి అనే నాటకాలు, ఇరుగు-పొరుగు, సుచిత్ర ప్రణయం, సప్తశిల, పొగ అనే నాటికలు, భరతుడు (ఏకపాత్రాభినయం) రాశారు. మరికొన్ని నాటికల్ని కూడా రాసినట్లు అర్థమవుతుంది. వాటిలో సప్తశిల, భరతుని ఏకపాత్ర ఈ రెండు పౌరాణికాలు కాగా, మిగిలినవన్నీ సాంఘిక నాటకాలు, నాటికలు. అందువల్ల సాంఘిక నాటకంపై కొంత ఉపోద్ఘాతం అవసరం.

వాస్తవ దృక్పథానికి, సాంఘిక చైతన్యానికి మూలమైంది సాంఘికనాటకం. సమకాలీన సమాజంలో ప్రతి సమస్యకు ప్రతిస్పందించేది, ప్రతి సంఘటనను ప్రతిస్పందింపజేసేది సాంఘిక నాటకమే! సాంఘిక నాటకమెప్పుడూ సమకాలీన సమాజాన్ని అన్వేషిస్తూనే సమాజ శ్రేయస్సుకు పాటు పడుతుంది. స్వాతంత్ర్యానికి ముందు సంఘ సమస్యలను ప్రతిపాదించిన సాంఘిక నాటకం స్వాతంత్ర్యం తర్వాత మధ్యతరగతి వ్యక్తుల జీవన సమస్యలను చిత్రించింది. రానురాను సాంఘిక నాటకాల్లో పెక్కు సమస్యలు ప్రస్తావించబడ్డాయి.

1928-29 సంవత్సరాల్లో బళ్లారి రాఘవ విదేశీపర్యటన చేసి పాశ్చాత్య నాటక రీతుల్ని ఆకళింపు చేసుకొని తెలుగు నాటకరంగంలో కూడా నూతనమైన విధానాన్ని ఆవిష్కరించారు. ప్రజల్ని చైతన్యవంతుల్ని చేయడానికి సాంఘిక నాటకాలే ఉపకరిస్తాయని ఉద్ఘాటించారు. అప్పటినుండి సాంఘికనాటకాల్ని ఎక్కువగా రాశారు. ఆక్రమంలో ఇప్పటిదాకా సంఘసంస్కరణ, దేశభక్తి, హేతువాదం, మూఢ విశ్వాసాలు, బాల్య, వృద్ధ వివాహాలు, కన్యాశుల్కం, వరకట్నం, స్త్రీ అభ్యున్నతి, లంచగొండితనం, కులమతాల ప్రసక్తి, వేశ్యావృత్తి, మద్యపానం, నిరుద్యోగం, రైతు సమస్యలు, ఆర్థిక అసమానతలు, భూస్వామిక వ్యవస్థ, విద్య, వైద్య, న్యాయ, పోలీస్ వ్యవస్థలు, స్త్రీ, దళిత, మైనారిటీ



## 17. తిలక్ నాటికలు - వస్తు విశ్లేషణ

- డా॥ జి. పార్వతి

ఆధునిక తెలుగు సాహిత్యంలో విరజుసిన మల్లెపువ్వులాంటి స్వచ్ఛమైన కవిత్వాన్ని అందించిన కవి దేవరకొండ బాలగంగాధర్ తిలక్. అందుకే కుందిర్తి ఆంజనేయులు “మావాడు మహాగట్టవాడు” అని తిలక్‌ను గురించి అభిప్రాయపడుతాడు. దానికి కారణం తాను జీవించింది కొంతకాలమే. అయితే అందులోను సగభాగమే కవిగా సాహిత్యాన్ని సృష్టించాడు. ఆ సాహిత్యం తెలుగు భాష నిలిచి ఉన్నంత దాకా నిలిచి ఉంటుంది. ఆధునిక పాఠకునికి ఏంకావాలో పట్టుకొన్నాడు. అందుకే ఛందస్సులోనే కవిత్వానికి అందం ఉందని భ్రమపడే లోకానికి వచన కవితా రచనలు రాసి వాటిలో అనుభూతి తత్వాన్ని దర్శింపజేసి విజయం సాధించాడు. ఆయన నాటకాలు, నాటికలు, కథలు, కవిత్వం, లేఖా సాహిత్యం, వ్యాసాల ఉన్నా ఆయన కవితలకు అధిక ప్రాధాన్యం తెలుగు సాహితీలోకంలో ఉంది. ఆయన రాసిన అమృతం కురిసిన రాత్రిలో ఒక్క వాక్యమైనా రాసిన సాహితీకారుడు గానీ, సాహిత్య విద్యార్థిగానీ ఉండడు. ఆయన అచ్చమైన భావకవి. అసలు సినలైన అభ్యుదయ కవి. రెండూ ఉద్యమాలు ఆయన సృజన సాహిత్యం సాక్షిభూతంగా నిలుస్తుంది. ఆయన రాసిన కవిత్వంలో భావకవితా భావన ఎక్కువగా ఉంటూ, అనుభూతి సాంద్రత అధికంగా ఉంటే, ఆయన రాసిన నాటకాల్లో, నాటికల్లో అభ్యుదయ భావనాజాలం కొబ్బరాకుల మాటున సూర్యకాంతిలాగా ప్రతి చోట దోబూచులాడుతోంటుంది. ఈ ప్రస్తుత పరిశోధన పత్రంలో తిలక్ నాటికల్లో వస్తు విశ్లేషణకు పరిమితమై ఈ వ్యాసం ముందుకు సాగుతుంది.

తిలక్ నాటికల్లో సుచిత్ర ప్రణయం, సుప్తశిల, పొగ, పాదుకా పట్టాభిషేకమందలి “భరతుని ఏకపాత్రాభినయం”, ఇరుగు పొరుగు అనే ఐదునాటికలను ఈ వ్యాసంలో విశ్లేషించడం జరిగించే ఈ ఐదు నాటికలను కూడా రెండు కోణాల్లో అధ్యయనం చేయవచ్చు.

## 24. తిలక్ కథలు - కవితాత్మక శైలి

- డా॥ వినోదిని మదాసు

తిలక్ అనగానే తెలుగు పాఠకులకి 'అమృతం కురిసిన రాత్రి' గుర్తొస్తుంది. వచన కవితా ఉద్యమం బలంగా ఉన్న కాలంలో తెలుగు కవిత్వంలో ప్రవేశించి తెలుగు కవిత్వంపై తనదైన ముద్రవేసినవాడు తిలక్.

కవిత్వంలో తిలక్ మూడు ముఖాలతో కన్పిస్తాడు. ప్రక్రియ పరంగా ఆనాటికి తెలుగు కవిత్వాన్ని ఏలుతున్న ఆధునిక వచన కవిత్వాన్ని వాహికగా చేసుకున్నాడు.

భావజాలపరంగా ఆనాటికి దేశం మొత్తం మీద అత్యంత చైతన్యవంతమైన ఆలోచనలను విస్తరింపజేస్తున్న అభ్యుదయ భావజాలం అందిపుచ్చుకున్నాడు.

శిల్పపరంగా, అభివ్యక్తిపరంగా భావకవిత్వంలోని రమణీయతను, సాగసుని, లాలిత్యాన్ని తన కవిత్వ నైపుణ్యంగా చేసుకున్నాడు.

తిలక్ కవిత్వం తెలుగు పాఠకులకు అత్యంత చేరువయ్యింది. వచన కవిత్వంలో శ్రీశ్రీ తర్వాత ఎక్కువమంది పాఠకులకు తెల్సిన కవి తిలక్. అటువంటి తిలక్ కవిత్వంతోపాటు కథలు కూడా రాశాడు.

తిలక్ కవిత్వం రాసినా, కథ రాసినా మనిషిని కేంద్రం చేసుకున్నాడు. కవిత్వంలో కొంత రొమాంటిక్ మార్గాన్ని అనుసరించిన తిలక్ కథా సాహిత్యం దగ్గరకొచ్చేసరికి ఊహా ప్రపంచాన్ని వదిలి వాస్తవ ప్రపంచాన్ని ఆలంబనగా చేసుకున్నాడు.

తిలక్ కథలు పేద, మధ్య తరగతి జీవితాలకు సంబంధించిన సమస్యలను ప్రతిబింబించాయి. మధ్యతరగతి జీవితాలను ప్రధానంగా శాసించేది ఆర్థిక వ్యవస్థ. ఆర్థిక పరిస్థితుల ప్రభావంతో కుటుంబాల్లో వచ్చే అనేక సమస్యలు కుటుంబ సభ్యుల మధ్య అశాంతిని, అలజడిని కలగజేస్తాయని - దీని పర్యవసానంగా మనుషుల ప్రవర్తన మారిపోతుందని తిలక్ తన కథల్లో పాత్రల ద్వారా చెప్పాడు.

# 26. తిలక్ సాహిత్యం - సందేశం

- డా॥ ఎన్. ఈశ్వర రెడ్డి

### పరిచయం

దేవనకొండ బాలగంగాధర తిలక్ ఆధునిక తెలుగు సాహిత్య చరిత్రలో ఒక మధురకవి. కవిత్వాన్ని - జీవితాన్ని సమానంగా ప్రేమించిన అమరకవి తిలక్, మానవ స్వభావంలోని కుళ్ళు కుతంత్రాలను కుమ్మేస్తూనే, స్వచ్ఛమైన అమృతప్రేమను వంచిన గొప్ప రచయిత తిలక్. మనసుకు - మనసుకు మధ్య భావోద్రేక వారధులు కట్టి వ్యాయ సంగీతాన్ని వినిపించిన సుమధుర భాషాజ్ఞాని తిలక్.

### జననం, విద్యాభ్యాసం

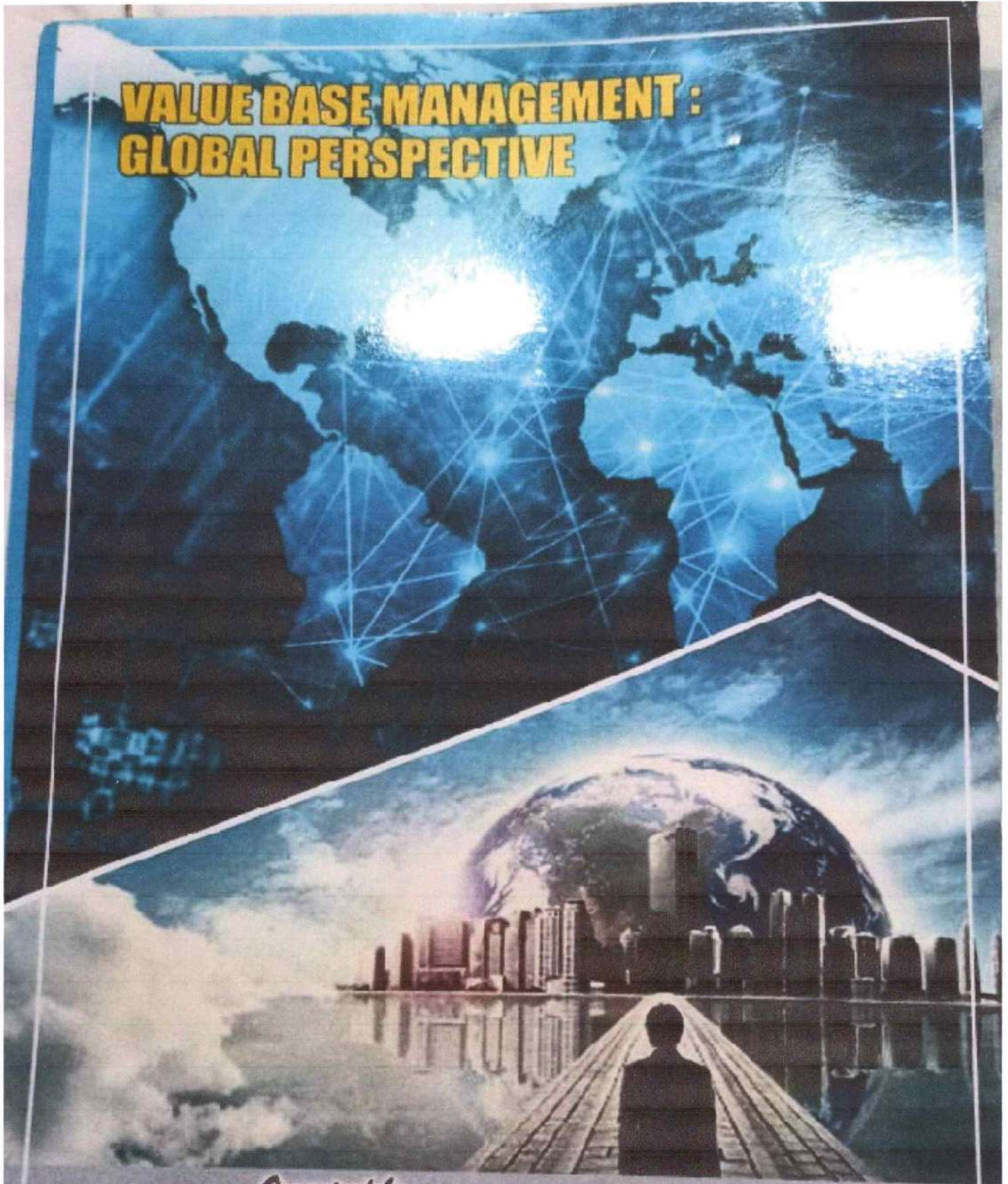
1921 ఆగష్టు 1న మందపాక తణుకు తాలూకా పశ్చిమ గోదావరి జిల్లాలో జన్మించిన తిలక్, వారి నాన్న సత్యనారాయణమూర్తి గారి హయాంలోనే తణుకుకు వచ్చి, అక్కడే స్థిరపడ్డారు. తల్లి రామసోదెమ్మ. స్వాతంత్ర్య సమరయోధుడైన బాలగంగాధర్ తిలక్ పై ఉన్న వీరాభిమానాన్ని ప్రకటించుకోవడానికి సత్యనారాయణమూర్తి తన ఆరవ సంతానమైన తిలక్ కు ఆ పేరు పెట్టాడు. ఎందుకంటే, సత్యనారాయణమూర్తి కూడా గొప్ప దేశభక్తుడు కాబట్టి.

తణుకు బోర్డు స్కూల్లో తిలక్ పాఠశాల విద్యను పూర్తిచేసి, ఇంటర్మీడియట్ కోసం మద్రాసు వెళ్ళాడు. లయోలా కళాశాలలో చేరి, అనారోగ్య కారణాలతో అర్ధాంతరంగా చదువుమానేసి ఇల్లు చేరినాడు. విశాఖపట్నం ఎ.వి.ఎన్. కళాశాలలో చేరి, అనేక కారణాలతో అక్కడ కూడా చదువు కొనసాగించలేకపోయాడు.

పాఠశాలలో చదివిన రోజుల్లో తెలుగు అధ్యాపకుడిగా ఉండిన పెన్మత్స్య సత్యనారాయణరాజు తిలక్ కు సాహిత్య గురువు. గురువు ప్రోత్సాహంతో 11 సంవత్సరాల వయసులోనే తొలికథ రాశాడు తిలక్. తెలుగు, సంస్కృత, ఆంగ్లభాషల్లో ప్రావీణ్యం సంపాదించిన తిలక్ కు ఈ మూడు భాషలు రచనకు బాగా ఉపకరించాయి.

ఎం.ఎన్. రాయ్ ను అభిమానించిన తిలక్ నవ్యకవిత్వ దారిలో నడిచాడు. జాతీయ, అంతర్జాతీయ సమాజాలను రాజకీయ దృక్పథంలో అర్థం చేసుకొని, తన సృజనలో స్వేచ్ఛకు ప్రాధాన్యం ఇచ్చాడు. ఇజాలకు, వర్గాలకు, పార్టీలకు అతీతంగా

# VALUE BASE MANAGEMENT : GLOBAL PERSPECTIVE



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ONGOLE.

Edited by

**Dr. B. PADMAJA**

# VALUE BASE MANAGEMENT: GLOBAL PERSPECTIVE



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## CHAPTERS

S.No	Title of the article	Page No.
1	<b>Value-Based Management approach: A Study between Shareholder &amp; Stakeholder</b> *Tallapareni Madhavi	1
2	<b>A Study On Sensitive Analysis Of Stock Market Returns At Sykes &amp; Ray Equities Ltd Hyderabad</b> * P Rathod, ** Mr. B. Sudheer Kumar,	7
3	<b>The Emphasis of Value based Management at Public and Private Partnership in Indian Power sector</b> *B.Giri Babu **V.Venkataswara Rao	17
4	<b>Association between line item factors and earning quality of select companies in BSE, India.</b> *M. Suman kumar ** Dr B. Padmaja	22
5	<b>Customer Relationship Management (CRM) Strategy: Potential Platform for Building and Developing the Customer Asset Base</b> * Dr. Landa Ramesh ** Dr. Gowrya Shaik	30
6	<b>Commercial Value Based Management Practices in India - a hypothetical revision of elected Models</b> * Dr.Evuru Poleraiah, ** Dr.B.Rajeev	36
7	<b>An Integrated Framework for Values Based Management – Guidelines from Indian Philosophy</b> *Dr. V.Krupavani, ** Mr.K. Hanumantharao	40
8	<b>CRM is the Key of Value Based Management Practices</b> *Dr.A.Vijay Gopal	45
9	<b>Value Based Management in Small and Medium Enterprises</b> *Mr. V.Ramesh	49
10	<b>MSME Sector -Lifeline of Indian Economy</b> * M. Murali, ** Prof: S. Raghunath Reddy	53
11	<b>Value based management perspectives: A review of ideologies of Rashtrasant Tukadoji Maharaj</b> *Dr.R.K.V.Somanadh, ** Dr.Sahebrao Chavan	58
12	<b>Role of Purushardas in Professional Ethics</b> * S.Sita Rama Murty	64
13	<b>Structural perspectives of value based management practices With special reference to CRM</b> * Dr. VN Siva Kumar Challa , ** Dr. Burra Vamsi krishna	70
14	<b>The Role OF Value Based Management within the success of an Organization</b> *Arjun **Amal K G	76

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## ABSTRACT

The Micro, Small and Medium Enterprises (MSME) are crucial for the economic development of any country and play a pivotal role specifically for developing countries as they regulate economic activity and generate employment thus significantly contribute in poverty reduction. After agriculture, this sector is the second largest employer in India. Indian MSME sector has emerged as dynamic and highly vibrant sector of the economy. MSME, not only play significant role in generating large employment by investing less capital as compared to large industries but also help to develop non-farm sector by increasing industrialization in rural areas. The sector acts as the instrument of inclusive growth empowering the most vulnerable and marginalized groups. The main objectives of the paper are to explore the growth in the number of MSME units, GDP contribution, employment and exports of Indian MSME sector, to analyze the relationship between growth of MSME sector and fulfilment of Sustainable Development Goals (SDGs) 2030, to see the contribution of MSME sector in creating green jobs in India and to highlight the problems of MSME sector. This paper is based on the secondary data extracted from various reports and research papers related to MSME. The time period from 2006-2007 to 2019-2020 has been taken into consideration. MSME sector is the significant contributor in GDP.

**Keywords:** Micro, Small and Medium Enterprises, Sustainable Development Goals, Economic Development, Inclusive Growth.

## Introduction

The world is battling with horrors like the COVID-19, which has left the entire world to a standstill. MSME is the maximum hit sector due to this global pandemic. So, considering this fact that the MSME sector is the lifeline of the Indian economy, the government announced immediate relief measures to re-energise this sector. Before going to the relief packages. The Micro, Small and Medium Enterprises (MSME) is a very important aspect of the Indian economy. This sector is considered as the job creator and plays a crucial role in providing large scale employment and industrialization of rural and backward areas. **Micro, Small and Medium Enterprises Development (MSMED) Act, 2006** which was notified on October 2, 2006, deals with the definition of MSMEs. The MSMED Act, 2006 defines the Micro, Small and Medium Enterprises based on

- The investment in plant and machinery for those engaged in manufacturing or production, processing or preservation of goods and

## Impact of coronavirus pandemic on Indian MSME Sector

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### ABSTRACT:

The coronavirus pandemic has been a body blow not only to the human population but to economies around the world. With the fourth highest number of Covid-19 infections as of June 30, India is no different. It announced an unprecedented and absolute nation-wide lockdown to control the spread of the virus on March 24. This brought the economy to a virtual standstill. Micro, Small and Medium Enterprises (MSMEs) were hit the hardest. Since April-end, lockdown restrictions have been gradually eased and industries have resumed work. But in the face of a galloping pandemic, the worst is far from over. The MSME sector, for instance, continues to struggle with cash flow, slowing demand and rising unemployment.

### Introduction:

MSME sector in India is second largest employment generator after agriculture, and acts as a breeding ground for entrepreneurs and innovators with considerable support in strengthening business ecosystem. The estimated number of MSMEs in India is 63 million and employs 110 million individuals. Indian MSMEs produce more than 6,000 products for local and global consumption. According to DGCIS data, the value of MSME related products in India is \$147,390.08 million and contributed 48.56% of total export during 2017-18. MSMEs exposed to higher level of integration with global value and supply chains are playing critical role in global trade systems. Data from 2019 shows that sector contributed 29% to overall GDP.

Various reports, researches and surveys have proved again and again that this sector act as a catalyst for socio-economic development of the country. All this becomes more important with government's new mission of achieving \$5 trillion economy target by 2025. Within this target the role of MSME sector is going play an important role, with expected contribution to GDP above 50% mark. The potential of Indian MSME sector is still untapped and that is one of the reasons why government policies are now more convergent towards building resilient ecosystem with better breadth and depth.

The government changed the criteria for what constitutes a micro, a small and a medium enterprise. It announced new definitions on the basis of investment (in plant, machinery and equipment) and annual turnover. Earlier, definitions were based purely on investment. These are the latest definitions:

- Micro enterprise: Investment up to Rs 1 crore, turnover up to Rs 5 crore
- Small enterprise: Investment up to Rs 10 crore, turnover up to Rs 50 crore
- Medium enterprise: Investment up to Rs 50 crore, turnover up to Rs 200 crore



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# Materials and features of ferroelectric photocatalysts: the case of multiferroic $\text{BiFeO}_3$

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## 9.1 Introduction

Ferroelectrics are a class of materials which exhibits reversible polarization on application of an electric field. The first ferroelectric material was discovered 100 years ago, that is, Rochelle salt which exhibits the sudden electric polarization (Si et al., 2019). Ferroelectrics are famous for their extensive properties such as narrow bandgap values, spontaneous electric polarization, superior magnetic properties, and they had several applications in capacitors, storage memories, wave guides, optical memory display, displacement transducers, etc. The list of ferroelectrics contains titanates ( $\text{BaTiO}_3$ ,  $\text{PbTiO}_3$ , and  $\text{SnTiO}_3$ ) (Alammar, Hamm, Wark, & Mudring, 2015), niobates ( $\text{LiNbO}_3$ ,  $\text{KNbO}_3$ ,  $\text{NaNbO}_3$ , and  $\text{AgNbO}_3$ ) (Zlotnik, Tobaldi, Seabra, Labrincha, & Vilarinho, 2016), tantalates ( $\text{LiTaO}_3$ ,  $\text{KTaO}_3$ ,  $\text{NaTaO}_3$ , and  $\text{AgTaO}_3$ ) (Yogamalar, Kalpana, Senthil, & Chithambararaj, 2018), and perovskites containing iron, that is,  $\text{BiFeO}_3$  and  $\text{LaFeO}_3$ .

In the field photocatalysis, narrow bandgap with suitable energy band potential and stability of the catalyst plays a crucial role.  $\text{BiFeO}_3$  is gaining more and more attention because of its visible-active bandgap for photocatalytic applications, this is the major reason behind choosing perovskite materials as catalysts (Yogamalar et al., 2018). However, it also has some limitations as other photocatalysts do, but majority of the characteristic properties were preferable for making an efficient catalytic material (Lin et al., 2014).  $\text{BiFeO}_3$  in short BFO is one of the promising candidates for the photocatalytic applications (Yao, Wencho

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# Metal organic framework-based photocatalysts for hydrogen production

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## 10.1 Introduction of metal-organic frameworks

In the recent years, the organic photochemistry has become a mature science and has been achieving a remarkable properties or chemical reactions upon light absorption (Noh & Jung, 2016). The discovery of porous materials in 1990s namely porous coordination polymers (PCPs) or metal-organic frameworks (MOFs), which resulted from the coordination of organic and inorganic materials, has grabbed significant interest among the researchers. MOFs consist of extremely large surface areas (1000–10,000 m<sup>2</sup>/g) due to ultrahigh porosity and the size of their pores ranges from the micro- to mesoporous regime (Stock & Biswas, 2012; Zhu & Xu, 2014). As depicted in Fig. 10.1, the structures of MOFs are composed of organic ligands (or linkers) and the metal clusters can serve as connectors (Cao, 2016). Due to a high degree of variability of the inorganic and organic components, there is a large library of esthetically pleasing structures that have vast applications, such as clean energy storage (methane and hydrogen), photocatalysis (Zhang & Lin, 2014), CO<sub>2</sub> capture, organic transformations (Chughtai, Ahmad, Younus, Laypkov, & Verpoort, 2015), and various separation processes (Li, Kuppler, & Zhou, 2009).

### 10.1.1 Historical developments

MOFs represent a special group of compounds that arise through the linking of metal ions by coordinate bonds to either organic or inorganic ligands. These polymers comprise various structures like one-, two-, or three-dimensional networks. Some of the examples of—with networks of Cu, Zn, Ag, and Cd—the late transition metals are represented in Fig. 10.2, and these coordination polymer structures could be determined only with the advantage of single-crystal X-ray diffraction. MOFs are not new since it was coined in

## Chapter 19

# Metal Nitrides and Graphitic Carbon Nitrides as Novel Photocatalysts for Hydrogen Production and Environmental Remediation



Sudesh Kumar, Kakarla Raghava Reddy, Ch. Venkata Reddy, Nagaraj P. Shetti, Veera Sadhu, M. V. Shankar, Vasu Govardhana Reddy, A. V. Raghu, and Tejraj M. Aminabhavi

### 19.1 Introduction

In the twenty-first century, humans are facing serious problems to provide renewable and clean energy to our modern society. Photocatalysis has been studied and is probable to gross an abundant influence on eco-friendly emissions and renewable energy. Photocatalytic hydrogen generation technology from water is the greatest encouraging method to grasp an economy of hydrogen due to usage of solar energy (its clean and enduring energy source); it is an ecologically harmless method

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## Chapter 15

# Titanate Nanostructures as Potential Adsorbents for Defluoridation of Water



C. Prathibha, Anjana Biswas, and M. V. Shankar

### 15.1 Introduction

Water is not only an essential component for life but also a basic building block to maintain quality of life. Its purity and availability are inextricably linked to global health and economic development. The presence of several naturally occurring, anthropogenic, and industry-generated ions such as fluoride, arsenic, nitrate, sulfate, iron, manganese, chloride, selenium, heavy metals, and radioactive materials greatly affects the water quality, leading to health problems. The most significant inorganic pollutants in groundwater affecting human health at the global scale, according to the World Health Organization (WHO), are arsenic and fluoride [1]. Fluoride is the only chemical in potable water that can cause varied health effects depending upon its concentration in dissolved form. It is often described as a “double-edged sword” as inadequate ingestion is associated with dental caries, whereas excessive intake leads to dental, skeletal, and soft tissue fluorosis which has no cure. A very small amount of fluoride (0.4–1.0 mg/L) is beneficial for bone and teeth development and dental health. Especially for young children, it promotes calcification of dental enamel and protects teeth against tooth decay. Therefore, it is considered as an essential mineral with a narrow margin of safety. Due to these clinical manifestations caused by drinking fluoride-contaminated water, the WHO has recommended 1.5 mg/L as the maximum contaminant level (MCL) in drinking water. Fluorosis due to excessive concentration of fluoride >1.5 mg/L has been reported in at least 28 countries from South Asia; Africa; the Middle East; North,

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## Chapter 3

# Hierarchical Nanostructures for Photocatalytic Applications



R. Ajay Rakkesh, Durgalakshmi Dhinasekaran, M. V. Shankar,  
and S. Balakumar

### 3.1 Basic Concepts of Hierarchical Nanostructures in Photocatalytic Field

Recently, nanosize- and quantum-size-based photocatalysts have attracted immense attention among the material scientist due to their excellent physicochemical properties in solving energy- and environmental-related problems [1–3]. The interaction between light energy and metal oxide semiconductors has generated excitons, and reactive oxygen species provided a sustainable opportunity to decompose any organic matter at micro level. Currently, a broad variety of metal oxide semiconducting materials have been demonstrated for specific as well as multifunctional applications, such as metal oxides with  $d^0$  and  $d^{10}$  configurations, semiconductor-based plasmonic nanostructures, metal oxynitrides/sulphides, metal-organic frameworks and perovskite-based photocatalysts [4–8].

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## Chapter 2

# Nanostructured Heterojunction (1D-0D and 2D-0D) Photocatalysts for Environmental Remediation



Lakshmana Reddy Nagappagari, Kiyoung Lee, Ajay Rakesh, Subramanian Balakumar, and M. V. Shankar

### 2.1 Introduction

Environmental pollution from industries, automobiles, domestic usage, and sewage activities has been constantly increasing day by day due to increasing population and utilization of all these pollution-causing systems [1–3]. Hence these mentioned human activities cause a major impact on water and air, which consequently damage nature and affect human beings very severely. Therefore, there is an urgent need to develop efficient technologies in a sustainable way to cop all these challenges and make pollution-free environment for future generations. In this connection the heterogeneous photocatalysis (PC) and photoelectrocatalysis (PEC) have become emerging technologies for environmental applications [4–6]. Much attention is paid especially on using various types of nanostructured photocatalysts due to their unique nanoscale properties like high surface area, quantum confinement, and a greater number of active sites for redox reactions on the surface of the photocatalysts in the reaction medium [7, 8]. Various types of nanomaterials like 0D, 1D, 2D, and 3D nanostructures (Fig. 2.1) have well focused on the environmental remediation such as organic dye degradation [9, 10], removal of metal ions [11–13], fluoride removal [14–16], organic contaminants [17–19], and other environmental

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# Chapter 1

## Nanostructures in Photocatalysis: Opportunities and Challenges for Environmental Applications



Y. V. Divyasri, Y. N. Teja, V. Nava Koteswara Rao, N. C. Gangi Reddy,  
Sakar Mohan, M. Mamatha Kumari, and M. V. Shankar

### 1.1 Introduction

The environment, which is essentially the air, water, and soil, is largely polluted due to the increased population and industrialization. These pollutants are mostly anthropogenic, and they generally include (i) the toxic-organic materials such as dyes, aromatic, and aliphatic molecules; (ii) agricultural wastages such as the pesticides, insecticides, and herbicides; (iii) plastics; (iv) pharmaceutical products and byproducts; (v) inorganic materials such as heavy metals; (vi) toxic gases such as CO, SO<sub>x</sub>, and NO<sub>x</sub>; and (vii) microorganisms such as bacteria, viruses, and fungi [1–3]. Release of these pollutants into the environment from various sources causes much adverse effects to the ecology, and it will make permanent damages and even more worse adverse effects if these pollutants are accumulated into the environment. Therefore, it is an urgent requirement to address such issues toward destructing and converting these pollutants into nontoxic. Considering current scenario of energy consumption, the world also requires energy- and cost-effective techniques to address the issues in the environmental remediation. In this aspect, photocatalysis is one of the reliable energy- and cost-effective and versatile techniques, which can almost degrade/convert into nontoxic/kill all of the abovementioned various categories of pollutants in the environment [4, 5].

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8	<b>Nanostructuring of Hybrid Materials Using Wrapping Approach to Enhance the Efficiency of Visible Light-Responsive Semiconductor Photocatalyst</b> .....	223
	V. Vinesh, A. R. Mahammed Shaheer, and B. Neppolian	
9	<b>Metal–Organic Frameworks (MOFs) with Hierarchical Structures for Visible Light Photocatalysis</b> .....	239
	P. Karthik and B. Neppolian	
10	<b>Soil Remediation by Zero-Valent Iron Nanoparticles for Organic Pollutant Elimination</b> .....	253
	Marco Stoller, Luca Di Palma, and Giorgio Vilardi	
11	<b>Black TiO<sub>2</sub>: An Emerging Photocatalyst and Its Applications</b> .....	273
	P. Anil Kumar Reddy, P. Venkata Laxma Reddy, and S. V. Prabhakar Vattikuti	
12	<b>Nanomaterials for Photocatalytic Decomposition of Endocrine Disruptors in Water</b> .....	305
	Ajay Kumar, Vishal Sharma, Ashish Kumar, and Venkata Krishnan	
13	<b>Carbonaceous Nanomaterials for Environmental Remediation</b> .....	327
	Natarajan Sasirekha and Yu-Wen Chen	
14	<b>Magnetically Recyclable Photocatalysts for Degradation of Organic Pollutants in Aquatic Environment</b> .....	371
	Ashutosh Kumar and Sushil Kumar Kansal	
15	<b>Titanate Nanostructures as Potential Adsorbents for Defluoridation of Water</b> .....	389
	C. Prathibha, Anjana Biswas, and M. V. Shankar	
16	<b>Photocatalytic Water Pollutant Treatment: Fundamental, Analysis and Benchmarking</b> .....	407
	Katherine Rebecca Davies, Ben Jones, Chiaki Terashima, Akira Fujishima, and Sudhagar Pitchaimuthu	
17	<b>Graphene-Based Photocatalytic Materials: An Overview</b> .....	439
	Alex T. Kuvarega, Rengaraj Selvaraj, and Bhekie B. Mamba	
18	<b>Recent Advances in Nanostructured Materials for Detoxification of Cr(VI) to Cr(III) for Environmental Remediation</b> .....	461
	Udayabhanu, S. B. Patil, and G. Nagaraju	
19	<b>Metal Nitrides and Graphitic Carbon Nitrides as Novel Photocatalysts for Hydrogen Production and Environmental Remediation</b> .....	491
	Sudesh Kumar, Kakarla Raghava Reddy, Ch. Venkata Reddy, Nagaraj P. Shetti, Veera Sadhu, M. V. Shankar, Vasu Govardhana Reddy, A. V. Raghu, and Tejraj M. Aminabhavi	

# Contents

<b>1</b>	<b>Nanostructures in Photocatalysis: Opportunities and Challenges for Environmental Applications</b> .....	<b>1</b>
	Y. V. Divyasri, Y. N. Teja, V. Nava Koteswara Rao, N. C. Gangi Reddy, Sakar Mohan, M. Mamatha Kumari, and M. V. Shankar	
<b>2</b>	<b>Nanostructured Heterojunction (1D-0D and 2D-0D) Photocatalysts for Environmental Remediation</b> .....	<b>35</b>
	Lakshmana Reddy Nagappagari, Kiyounng Lee, Ajay Rakesh, Subramanian Balakumar, and M. V. Shankar	
<b>3</b>	<b>Hierarchical Nanostructures for Photocatalytic Applications</b> .....	<b>67</b>
	R. Ajay Rakkesh, Durgalakshmi Dhinasekaran, M. V. Shankar, and S. Balakumar	
<b>4</b>	<b>Nanocomposite Photocatalysts for the Degradation of Contaminants of Emerging Concerns</b> .....	<b>89</b>
	Rokesh Karuppannan, Sakar Mohan, and Trong-On Do	
<b>5</b>	<b>Sunlight-Mediated Plasmonic Photocatalysis: Mechanism and Material Prospects</b> .....	<b>119</b>
	Durgalakshmi Dhinasekaran, M. R. Ashwin Kishore, and Mohanraj Jagannathan	
<b>6</b>	<b>Photocatalytic Efficiency of Bi-Based Aurivillius Compounds: Critical Review and Discernment of the Factors Involved</b> .....	<b>143</b>
	Manjunath Shetty, Murthy Muniyappa, M. Navya Rani, Vinay Gangaraju, Prasanna D. Shivaramu, and Dinesh Rangappa	
<b>7</b>	<b>Intrinsically Conducting Polymer Nanocomposites in Shielding of Electromagnetic Pollution</b> .....	<b>173</b>
	Suneel Kumar Srivastava	

230 a (1-5)  
(230b-f)

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# Nanostructured Materials for Environmental Applications



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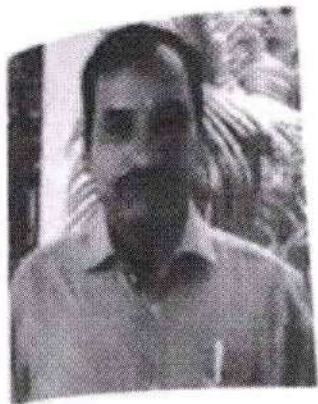
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# 69. మనిషిని ప్రేమించిన కవి తిలకుడు

- డా॥ ఎన్. ఈశ్వర రెడ్డి



భావాభ్యుదయ కవిగా, అనుభూతివాదిగా, ఇజం అనే ప్రీజమ్ లో చిక్కుబడిన రచయితగా తెలుగు సాహితీలోకంలో స్వచ్ఛావిహారం చేసినకవి దేవరకొండ బాలగంగాధర తిలక్. కృష్ణశాస్త్రి భావుకలోకాలలో విహరించి, శ్రీశ్రీలా సమాజంలోని దుర్భరపరిస్థితులపై యుద్ధంచేశాడు. గొప్ప సౌందర్య వంతమైన భావుకత ఒక

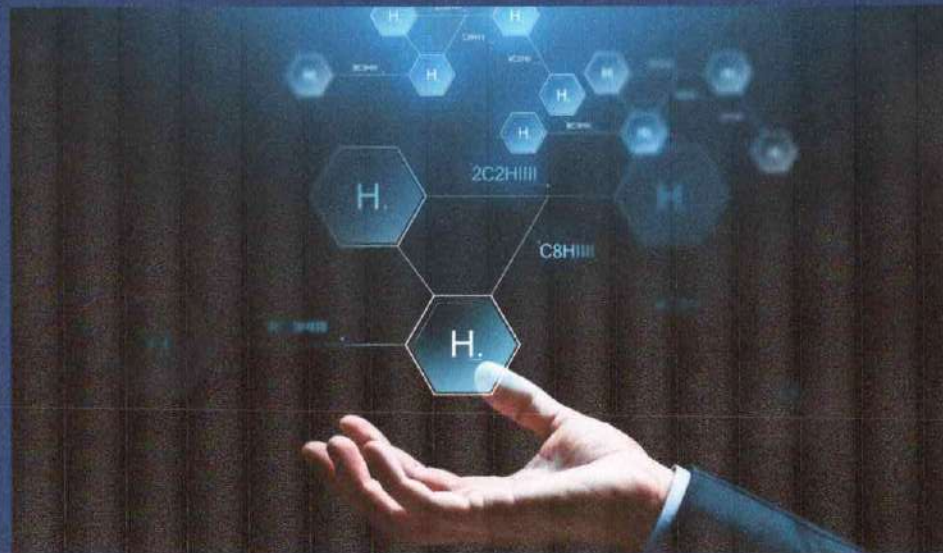
పక్క సామాజిక విషాదాలు మరొక పక్క కవిత్వంలో తొంగిచూస్తాయి. 'బాధాసర్ప ద్రష్టులైన మనుషులను ప్రేమించడం తిలక్ కవిత్వంలో స్పష్టంగా కనిపిస్తుంది. శ్రీశ్రీ చెప్పినట్లు 'కవితాసతి నొసట నిత్య రసగంగాధర తిలకం'గా నిలిచిన తిలక్ కవితా చందనకాలలో మానవత్వాన్ని గుభాళింప చేశాడు. 'బ్రతుకు సీమలలోన/పైరునాటగ సేను/ చలువ కన్నీటి మళ్ళకు / చెలువుటందాల విత్తులకు / పరమేశ్వరుని మించి / బైక్కు మడిగిన దేనె / కరుణతో స్వర్లోక పరమనాదమ్ము / ఈ జీవవేణువు నింపవోయి! ఈ మూగ గొంతులో మీటవోయి! (మూగనోము, ప్రభాతము-సంధ్య) అని తన కవిత్వానికి సంకల్పం పలుకుతున్న తిలక్, ఆ లక్ష్యాన్ని ఎక్కడా అలక్ష్యం చేయలేదు.

అట్టడగుమనిషి, బాధలతో బాగా నలిగిపోయిన మనిషిపడే వేదనకు ప్రతిబింబమై నిలిచి 'కదులునా కన్నీట చెదిరిపోయిన పడవ సత్యాలయమ్ములో స్వామి చరణ సన్నిధికి' అంటూ మూగవేదనను వినిపిస్తాడు. 'సడిలేని వేదనకు, వెలలేని యర్పణకు' అక్షర రూపంకూర్చి ఆలోచింపచేస్తాడు. "నీదు కన్నీరు / నిఖిల భాగ్యమ్ము! నిస్త్రాణ జగతికి/ నిషాగొల్పు మధువోయి" (కవి కన్నీరు - ప్రభాతము-సంధ్య) అంటాడు. కవి గుండెలోని కన్నీరు కలం ద్వారా ద్రవిస్తుంది. ఆ కన్నీరు ఒట్టి వైయక్తికం కాదు. దీనుల బాధలను చూసి రోసి పోబెత్తిన చైతన్య తరంగాలు. ఆ స్పందనలు లేకుంటే కవి మనిషి పట్ల ఆత్మీయుడు కాలేదు. పరుల బాధలను మనుసులోకి తీసుకోలేదు. అదే ఆర్ద్రత, అదే స్పందన, అదే వేదన, అదే రోదన. ఇవన్నీ కవిలో నుండి పలకాలంటే అతనిలో కన్నీళ్ళు ఉండి తీరాలి. అదే ద్రవించే మనసు. స్పందించే హృదయం. అలాంటి సున్నితమైన స్పందనలను కవి కోల్పోకూడదని చెప్పడంలో, తిలక్ కవిగా అక్షరాలను దయాపారవతాలుగా, విజయ ఐరావతాలుగా, అందమైన ఆదపిల్లలుగా మలిచాడు. 'మేం మనుష్యులం/ మేం మహస్సులం / మాకు దాస్యంలేదు/ మాకు

2030a

### Metal-Chalcogenide Based Core/Shell Photocatalysts for Superior Hydrogen Generation

Water splitting into gaseous hydrogen and oxygen utilizing sunlight and photocatalyst is a sustainable way for cleaner energy production. Development of efficient and stable photocatalysts for enhanced rate of H<sub>2</sub> generation from water, water containing inorganic or organic sacrificial agents is the current research trend. In order to overcome photocorrosion property of metal chalcogenides, wrapped it with shell made-up of TiO<sub>2</sub> or NiO as thin-layer. Parametric studies facilitated identification of best experimental conditions and demonstrated enhanced H<sub>2</sub> production besides catalytic stability, Time on steam, recyclability and reusability.



V. Navakoteswara Rao  
M. V. Shankar



V. Navakoteswara Rao was born on 14th May 1990 in Nagulapadu, Andhrapradesh state. He was graduated MS in Analytical Chemistry April 2014 from Sri Venkateswara University, Tirupati. Further Awarded PhD in the field of design and developments of photocatalyst for efficient H<sub>2</sub> efficiency from Yogivemana University, Kadapa, India.

FOR AUTHOR USE

V. Navakoteswara Rao, M. V. Shankar

# Metal-Chalcogenide Nanophotocatalysts for Superior Hydrogen Generation



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## Chapter- 41

# UG Students' Perception on Management Education (M.B.A)

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<sup>2</sup>Research Scholar, Department of Business Administration, Y.V. University, Kadapa

### Abstract

*It has been observed since a decade the demand for MCA course has been decreased whereas the demand for MBA Course has got boom. In recent era most of the UG students are showing their keen interest to join into the Management courses irrespective of their UG background. In fact, the reason behind the huge response of admission into the Management course is due to more job opportunities and also MBA course can create more job providers than job seekers. The present study focus on assessing the perception of UG final year students on Management education.*

*Keywords: Management Education, Employability skills, Job providers.*

### I. Introduction

Master of Business Administration (M.B.A) is one of the most popular qualifications in management education and it became almost requisite to everyone who are looking to lead a professional life and to excel in the business world. The ability to think creatively, analytically and strategically, complemented by the intra-personal skills and inter-personal skills encourages the corporate companies to hire MBA graduates. MBA can also help the people who wants to lead independent professional life and have a goal to become job provider rather than job seeker. As we are listening from many decades that our India is the developing country. One the major reason for this is huge unemployment rate. To reduce unemployment rate, definitely there is a need to create more entrepreneurs in rural areas.

### Literature Review

C. Karthick & Akhil augustain (2015), doing higher studies would be good for student has they would get more knowledge and personal development would help them to get better job opportunities.

Bhavana R. Shetty & Rajashree Gujarathi (2013), indicated that the student's perceived high quality of education if processes and outputs are satisfactory.

Quacquarelli (2005) indicted that the MBA is a significant investment in one's personal development as it affects the stream of income for an MBA graduate.

## Chapter- 37

# Scenario of Business and Management Studies in Andhra Pradesh: A Case Study

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### Abstract

*Andhra Pradesh is blessed with numerous educational institutions and colleges which extend hands for making the state more literate state. Especially there are a greater number of business and management colleges in Andhra Pradesh. Management education provides better communication skills, self confidence, strategic thinking. An MBA (management education) as a professional business degree, it gives a number of benefits both in expected and unexpected ways in life. In fact, those benefits often extend beyond career and professional goals. Hence, majority of the pupils in Andhra Pradesh are choosing management education as promising degree program to ensure a bright future and career. The present study concentrates on the current status of management education in AP. It also discusses the reasons for changing condition of management education in Ap. This paper explores some suggestive measures.*

*Key words: Management education, professional degree, strategic thinking, bright future and career.*

"The Conventional definition of management is getting work done through people, but real management is developing people through work".

### Introduction

Management education is important for creating efficient managers, who have excellent administrative, technical, communication and conceptual skills for performing all the functions of management. The value of management to societies is almost incalculable. At present the managers are not able to deal with the problems of business organizations in the real world. The Indian management education is still facing a number of challenges. Management education is the need of the hour today to focus on the quality of management education in the country.

Education is the primary agent of transformation towards sustainable development and increasing people's capacities to transform their visions into reality. In the modern economic scenario all over the world "Management" as a stream of education and training has acquired new dimensions. Management is an exciting field where you can have an immediate impact on

## Chapter- 30

# Management Education in India: The Changing Scenario & the Way Forward

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<sup>1</sup>Research Scholar, Department of Management Studies, YVU-Kadapa  
<sup>2</sup>Assistant Professor, Department of Management Studies, YVU-Kadapa

### Abstract

*The Indian economy is growing at a fast pace creating considerable opportunities in the field of IT, manufacturing, pharma, etc. But we also have to realize that a rapid economic growth through these sectors can happen only with the help of amply skilled managers, which will give the country a desired impetus for the development of each sector. But the biggest challenge for businesses operating in the dynamic environment of today is the need of competent managers. The Indian government liberalized the business education market over the 1990s resulting in a rapid growth of business schools offering programs at both graduate and post graduate levels. The purpose and value of MBA (Master of Business Administration) degree has always been under the critic's scanner. There are many issues and challenges in Management Education in India. Many studies have also undertaken and addressed on Funding problem, Institutions proliferation, Faculty Vacuum, Curricula, Poor Research and Publication, Geographic Inequalities, Increased Competition, Lack of Indigenous Reference Material, Lack of Industry Linked Training & Mentorship, Quality and Development of Faculty, Selection Process of Students and Ignorance of Business Ethics. But they have not focused on Affiliation System, Classroom Diversity and Industry veterans without a PhD.*

*Keywords: Management Education, Affiliation System, Classroom Diversity and Industry veterans without a PhD*

### Introduction

"The Indian economy is growing at a fast pace creating considerable opportunities in the field of IT, manufacturing, pharma, etc. But we also have to realize that a rapid economic growth through these sectors can happen only with the help of amply skilled managers, which will give the country a desired impetus for the development of each sector. This is the reason why more and more business management schools are springing up in the nation. Management education is at its boom in India with more than 1000 business schools offering the same.

Besides, India's new educational policy - Foreign Universities Bill further means a hike in the number of foreign business schools in the country leading to better education with the exchange

## Chapter- 29

# Management Education in India: Issues & Challenges

R. Uma Devi<sup>1</sup>, Dr. A. Amruth Prasad Reddy<sup>2</sup>, G. Surekha<sup>3</sup>

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<sup>2</sup>Research Supervisor, Yogi Vemana University, Kadapa.

<sup>3</sup>Assistant Professor, CBIT College, Proddatur.

### Abstract

*Management education in the current scenario seems to be diversified across the spheroid which plays a decisive role when talking about qualified education. The major issues lying around us in terms of education like the personality development sessions, faculty development programmes, employment opportunities and compensation for the MBA graduates are not up to the mark. Now a day's B-schools are facing a lot of issues because of lack of quality education, developing worthy curriculum, poor technology for the class room lectures and governance and accountability. Here we can find indigent regulatory frame work or malfunctioning of regulatory bodies. It seems there is a shortage of context and concept in the education and gives more priority for the communication dealing with lot of seminars and group discussions. Here in this paper we are analyzing the current scenario of management education and remarkable insights that may be valuable for the benefit of stakeholders.*

*Keywords: Management education, lack of quality education, worthy curriculum, B-school governance, malfunctioning of regulatory bodies.*

### Management Education in India :- An Overview

Today's Indian Economy has been changing at a fast pace with the emerging era of Pharma, IT and Manufacturing sectors but the lack of quality production has been identified in every sector that is amply because of skilled managers to give our country a desired impetus for the development of each sector. Thus identified the importance of management education which springs up the budding managers in our nation. Now in India there are about 1000 B-Schools offering the same.

Introducing new educational policy-foreign universities Bill means that foreign business schools in the country have been listed as a leading B-Schools, however it was surprised to know that Indian B-schools are far better than any other B-schools among Asian ones, why because Indians discuss the global ideas and class room lectures even the brain storming sessions also in English unlike other Asian countries B-schools like China, Japan where they teach in their national languages only.

## Chapter- 28

**Management Education in India - An Overview**Dr S. Subba Reddy<sup>1</sup>, K. Maddileti<sup>2</sup><sup>1</sup>Assistant Professor & Co-ordinator, Dept of MBA, Yogivemana University, Kadapa  
<sup>2</sup>Research Scholar, Dept of MBA, Yogivemana University, Kadapa.**Abstract**

*The Indian economy is growing at a rapid pace generating significant opportunities in the fields of IT, manufacturing, pharmaceutical, etc. But we also need to understand that a rapid economic growth through these sectors can only happen with the help of highly skilled managers, which will give the country a necessary impetus for each sector's development. This is the reason why the nation is springing up more and more business management colleges. Management education in India is booming with over 1000 business schools providing the same.*

*In the 1990s, Indian Government liberalized business education, resulting in rapid growth of Management Institutes offering both graduate and undergraduate levels to programmers. Indian management education is almost a replica of US business education, especially in the field of pedagogy, curricula, industry interface and academic research models, but it is observed that Indian management institutes are struggling hard to implement multiple adaptations due to differences in the work culture structure. As a result of globalization, many shifts are found in the functioning of industries worldwide requiring multi-skill manpower rather than merely knowledge-oriented. Top Institutes of Management are continually changing content & distribution modes. This paper examines the insights and overview of management education in India.*

*Keywords: Education, management, Indian economy, business, globalization*

**Introduction**

The Indian economy is growing at a rapid pace generating significant IT, manufacturing, pharmaceutical, etc. opportunities. But we also need to understand that rapid economic growth through these sectors can only come about with the aid of highly skilled managers, which will give the country a necessary impetus for each sector's development. This is the reason why the nation is springing up more and more business management colleges. Management education in India is at its peak with over 1000 business schools providing the same.

In addition, India's latest educational policy-Foreign Universities Bill further signifies an increase in the country's number of foreign business schools leading to better education through global exchange of ideas. However, you will be surprised to know that, for that matter, an Indian

# Chapter- 26

## Management Education in India: Issues & Challenges

Dr S Subba Reddy, A Raghavendra Prasad

Asst Professor, Research Scholar

Yogivemana University, Department of Management Studies, Yogivemana University, Kadapa

### Abstract

*Education is a potential driver of growth and is the best tool for minimizing economic condition, getting better health, reducing gender inequality, increasing harmony, and maintaining firmness. The main objective of the present paper is to know the evolution of management education in India & to identify its important issues and challenges. In India higher education especially Management education is witnessing a exponential growth in terms of number of institutes imparting management education which are usually termed as Business School. The paper describes the rise of management education in India, relevance and significance, different issues and challenges faced by B-schools in India and strategies to improve with emphasis on faculty retention, faculty development, functional literacy and academic excellence. Further it tries to study emerging issues of Management education, and to find implementation of possible direction and policy towards improvement of management education in India.*

*Keywords: Management Education, Management, Business School*

### 1. Introduction:

Education is defined as the learning of knowledge, Skill & practices of one group, who transfer the information from generation to generation through Mentoring, Coaching and Guidance with means of extensive research. In other words Education is the systematic process of instruction in School, Colleges and Universities that enables to practice the theory into practice. Management education is one among those which got a new dimension with this changing time. Initially Marketing, Finance and Human Resource Management were considered as functional area of management, but now management education covers much more functional area like Operations, Information Technology, International Business, Supply Chain Management, retail and much more to add to the list.

### 2. Brief Evolution of Management Education:

The Evolution of management education in India dates back to the late 1940s. The first department of management studies was set up at Indian Institute of Science, Bangalore in 1948.

## Chapter- 25

# Management Education: Current Challenges and Future Perspectives

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### Abstract

*The world and working life changing gradually and dramatically so it requires a demand of management education. An efficient management education is needed for every country as the efficient managers are required to run the corporate world. This active managers with skills, abilities are available when they got education from good institutions. There are so many challenges faced to transformation of management education. The study going to reveal the current challenges in implementation of management education and development of management education in future and how it is important to us. The main purpose of the study is transformation of current management education into future and it identifies the present position of management education in India. The study is purely based on collection of secondary data and it uses descriptive research design.*

*Keywords: B-Schools, pedagogy, quality education, challenges.*

### History

Management is part of a civilization. Management skills are found in ancient civil Mohanzadaro and Harrapan civilization. Srimath Bagavadgeeta written many years back there found out managerial wisdom and how to avoid conflict. Great epics of Ramayana, Mahabarata, Vedas, srutis, puranas, teach us management. The Vedas like Brahmanas, Darnasutras also have details of management, wisdom, skills. Koutilya, popularly known as Chanakya, prime minister of Chandra gupta mourya famous for administration skills.

Education in India known from British rule. It is oriented towards generating of skills that can do more than think. Globalization has created many challenges in the education and created more challenges, opportunities of the world that enter into India also. It suggested think out of the box in education rather than just learning.

New era of Management education started in INDIA and formal management education was initiated 50 years back. From 1990'S onwards the management education was started and still it is going to many paradigm shifts to get right shape.

## Chapter- 24

# Issues, Challenges & Opportunities in Management Education in India

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### Abstract

Management education has taken different shapes in India. During 1985-90, due to privatization, management education was offered by several institutions and it was like a mushroom growth. The regulatory bodies were allotted to grow it like an unorganized sector. But after 2010, slowly the regulatory bodies started controlling the management institutions, mainly by using Information Technology. In India, management education has made significant growth since its inception in 1950s, and by the mid 1960s India became one of the leaders in the field of management education. At present, India has the second largest number of business schools in the world. However, the expanding of B-Schools in India led by globalization has resulted in an intense competition among the B-Schools themselves giving rise to many contemporary issues and challenges in the changing time affecting the quality of management education in the country.

*Keywords:* Management Education, Information Technology, B-School, Globalization

### Introduction

Present corporate world is full of competition. New technologies are emerging every day, and everything is turning towards globalization. In such challenging situation, young managers possessing management degree turn out to be survivors. The biggest challenge of the corporate world is to produce efficient managers. A management degree from a reputed institution certifies that the person holding the degree has enough managerial skills required to face the competition. Management courses develop skillful workforce which constitutes of leaders of future as well as competitive managers. Today managers are in great demand in every sector of economy. India needs a huge reservoir each year of people who are trained for business and for management and demands is to last for coming years. But it is matter of concern whether the demand is for what they have been taught. In management education, quality has become a necessity. To make India an intellectual capital of the world, we have to create a dynamic environment, which can encourage superior quality management education colleges and effort should be made to breathe life into management education.



## Chapter- 17

# Emerging Trends, Issues and Challenges Faced by Management Education in India

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### Abstract

*The purpose of this paper is two-fold. It is to assist local authorities in the evaluation of their own systems of quality assurance and educational development, or quality development as it is increasingly known, and to set out the quality indicators which will provide the basis for external inspection and Best Value scrutiny of the education functions of local authorities. Through self-evaluation, authorities will be supported in providing continuously-improving services in their area and meeting the requirements of the Best Value initiative. The fact that the quality indicators will be used for inspection and other forms of external scrutiny removes any mystique from the inspection process. Although purposes and audiences may be different, the language and basis for self and external evaluation should be the same so that there can be an open and honest dialogue and consistency across different areas and different evaluators.*

*Keywords: Management Education, Quality, Improvement, Emerging Trends.*

### I. Introduction

Management Education is all about learning different skills and to apply them for mutual and multi faceted growth and value creation. Its aim is to create the desired competence for the optimum and most productive utilization of man and materials. In this volatile and fast changing scenario when every other day new technology is emerging and rendering the older one obsolete and outdated, it is imperative that management education should be dynamic and responsive towards the new challenges that are knocking at its doorstep. As an emerging and promising

## Chapter- 14

# Recent Trends, Emerging Issues and Implications Involved in Management Education: India

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### Abstract

Usually, students are fascinated towards management education, as it is driven by positive results. Higher Education in India is experiencing an exponential growth in terms of the number of institutions providing management education, management education which is commonly called business school. The present paper tries to find out the current state of management education in India, this paper also studies the trends prevalent in management education in India, and tries to explore the implications involved in management education in India on industry and individuals. In addition, it tries to study the emerging issues of management education and find the implementation of the policy and the potential towards improving management education in India. This paper will fill the gap between existing literatures, as not much work has been done in this area.

**Keywords:** Management Education, Management, Business School, India

### Introduction

The development of management education can be traced back to the 18<sup>th</sup> century. From 18<sup>th</sup> century to 21<sup>st</sup> century, management education has seen lot of changes and development. Management education in India is predominately a derivative of western management thought and practice. Occasionally, management schools draw some inferences from Indian epics, shastras and practices. It may be worthwhile to notice that management itself as a discipline, evolved from fundamental disciplines of philosophy, psychology, economics, accounting, computer science, mathematics, statistics and industrial engineering. In India, management education is seen as exclusive. Often, young men and women are attracted to management education not because they need some education, exposure and experience to create something wonderful, and hence to useful society but are usually motivated by the positive consequences associated with management education. In 21<sup>st</sup> century, India witnessed a transformation in its educational system. Process of liberalization, privatization, globalization has not only replaced traditional approach with a more efficient professional approach; but also introduced new age courses in accordance

## Chapter- 7

# Challenges, Issues and Opportunities in Management Education

Y Mallikarjuna Achari<sup>1</sup>, Dr P. V. Varaprabhakar<sup>2</sup>

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### Abstract

*In this paper, we have examined the present status of management education in India. The key issues have been identified for bringing efficiency, sufficiency and equity in the overall system of higher education including management education. Abilities of head and heart, skills and knowledge (ASK) are the engines of economic growth and human development of any economy like India. In reality we are responding more effectively and promptly to challenges and opportunities of globalization which means internationalization of Indianization for all of us. It has created avenues for jobs for skilled professional in management. According to Economic Survey 2011-12, India is going to be the youngest nation with largest work force in the world which possesses the potential to become an economic superpower. Future technologies call for cusp of a revolutionary change in management education for meeting the growing requirements of the industry.*

*Keywords: Management Education, Policy Formulation, Knowledge-Oriented Paradigm of Development*

### Introduction

Indian economy is going to emerge as a knowledge economy with third largest technical manpower in the world after US and China. However, compared to our population (1210.19 million-2011 census) it is not significant and there is a tremendous potential and scope of ensuring efficiency, sufficiency and equity. In India, the emphasis has been on general education, with vocational education at the receiving end. This has resulted in large number of educated people remaining unemployed which justifies the rationale for vocationalisation of education. In the new knowledge economy, to achieve professional, managerial, operational, and behavioral, inter personal and inter functional skills, India needs flexible education and training system that will provide the foundation for learning to develop required competencies with morality, credibility and accountability (MCA) through spirituality- the science of soul which can make us superior to anyone in the World. By changing the tracks of our thoughts we can turn the tides in our favor. We need to open the windows of the mind and spirit by spiritual revolution above religious differences. We need to transmit the Indian wisdom flowing from our epics with mental superiority

## Chapter- 5

# Trends, Issues and Challenges in Management Education

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### Abstract

*The business and management education could play a pivotal role in social uplift and triggering the entrepreneurial spirit in a society. The business schools face several challenges in terms of imparting quality education. External environmental forces and stakeholders continuously put pressure on the business schools to adapt the changes happening in the business world. The rapid trend of globalization and technological changes have made difficult for organizations to survive in the competitive world. As a result the importance of management education has increased many folds. Business executives need to update their skills due to sudden changes in the external environment. In order to meet the challenges of the future, the reform of the higher education could be unavoidable. The Education Institutions need to strive to achieve balance between the education cost and the quality. One of the major criticisms of MBA schools is the gap between theory and practice.*

*Keywords: Business, Management Education, Skills, Theory and Practice.*

### I. Introduction

Management education is considered as elitist as it attracts young men and women who are usually motivated by the positive consequences associated with management education. In India higher education especially management education is witnessing an exponential growth in terms of number of institutes imparting management education which are usually termed as business school. The management education plays an essential role in today's dynamic business environment. The rapid trend of globalization and technological changes have made difficult for organizations to survive in the competitive world. As a result the importance of management education has been increased many folds. Business executives need to update their skills due to sudden changes in the external environment. Due to the increasingly complex nature of organization and businesses, there is a need that the business schools impart relevant, current, and cutting edge knowledge to the students. This research also identifies some of the emerging areas in the

Ch.No.	Title of the Chapter	Page No.
40.	<b>Towards A Spiritual Pedagogy - Meaning, Practice and Applications in Management Education</b> <i>- G. Manjula, Dr. B. Abdul Azeem</i>	329
41.	<b>UG Students' Perception on Management Education (M.B.A)</b> <i>- Dr. S. Subba Reddy, Mr. Y. Nagendra</i>	336

Ch.No.	Title of the Chapter	Page No.
26.	<b>Management Education in India: Issues &amp; Challenges</b> - <i>Dr. S. Subba Reddy, A. Raghavendra Prasad</i>	210
27.	<b>Management Education- Historical Perspective, Issues &amp; Concerns</b> - <i>P. Samyukta</i>	217
28.	<b>Management Education in India - An Overview</b> - <i>Dr. S. Subba Reddy, K. Maddileti</i>	225
29.	<b>Management Education in India: Issues &amp; Challenges</b> - <i>R. Uma Devi, Dr. A. Amruth Prasad Reddy, G. Surekha</i>	240
30.	<b>Management Education in India: The Changing Scenario &amp; the Way Forward</b> - <i>S. Ismail, Dr. Y. Subbarayudu</i>	247
31.	<b>Management Education in India: Issues &amp; Challenges</b> - <i>S. Lesiya, S. Izaz Ahammed</i>	255
32.	<b>Management Education: A Journey from Ancient Time to 21<sup>st</sup> Century with Reference to Andhra Pradesh</b> - <i>P. Rechal Kumari</i>	261
33.	<b>Marketing for Business Education in India: Perspectives, Issues and Challenges</b> - <i>P. Divya</i>	271
34.	<b>Past, Present and Future of Management Education in India</b> - <i>Vasanthi Donthi</i>	279
35.	<b>Reengineering of Management Education in India from Traditional to Modern</b> - <i>P. Sumalatha</i>	287
36.	<b>Reforms for Maintaining Quality of Education in Management Institutes- Indian Scenario</b> - <i>Dr. P. Nagaraja</i>	296
37.	<b>Scenario of Business and Management Studies in Andhra Pradesh: A Case Study</b> - <i>Shabreen Shaik, Dr. P. Saritha</i>	307
38.	<b>Student Perception Towards Management Education in Private Engineering Colleges with Reference to Kurnool City</b> - <i>Dr. Ch. Krishnudu, Mr. M. Y. Naidu</i>	316
39.	<b>The Prospect of Management Education in India</b> - <i>TG. Swetha</i>	324

Ch.No.	Title of the Chapter	Page No.
13.	Emerging Challenges of Management Education in India - L. Manasa Veena	99
14.	Recent Trends, Emerging Issues and Implications Involved in Management Education: India - Dr. S. Subba Reddy	107
15.	Emerging Issues of Management Education in the 21 <sup>st</sup> Century-Global Scenario - Dr. T. Shesadri Kiran	118
16.	Emerging Trends in Commerce and Management Education in India - Dr. Mahesh Chandra	124
17.	Emerging Trends, Issues and Challenges Faced by Management Education in India - Shaik Abdul Mazeed, Dr. P. Saritha	131
18.	Emerging Trends of Case-based Pedagogy in Management Institutes - R. Ramesh	143
19.	Evolution of Management Education- Past, Present and Future Scenario - Chitti Babu Illangi, Dr. J. Vijetha	154
20.	Future of Business Schools in India: A Study to Understand and Comprehend its Value Additions to Business Learners - P. Shailaja	160
21.	Globalizing Management Education in India: Issues and Challenges for Industry and Academia - Dr. Dowlath Ahamed	173
22.	Issues and Challenges of Management Education in India: A Global Review - Ravi Rachapudy	182
23.	Issues and Concerns of Management Education in India - A. Suman Kalyan	188
24.	Issues, Challenges & Opportunities in Management Education in India - M. Harita, Dr. A. Amruth Prasad Reddy	197
25.	Management Education: Current Challenges and Future Perspectives - C. Sowbhagya Lakshmi, R. Uma Devi, A. Amruth Prasad Reddy	204

## Contents

Ch.No.	Title of the Chapter	Page No.
1.	<b>Plight of Management Education: Conflicting Objectives of Regulators Vs Institutions</b> <i>- Mrs. E. Prashanthi, Dr.P.Narayana Reddy</i>	1
2.	<b>A Comparative Study of Management Education in B- Schools and Affiliated Colleges in India</b> <i>- C. Uma Devi, J. Pragna</i>	10
3.	<b>A Conceptual Study on Diverse Issues of Business Management Education</b> <i>- Dr. Naiymunnisa Begum</i>	16
4.	<b>Challenges and Recommendations Associated with Management Education in India</b> <i>- Dr. S. Subba Reddy, Dr S. Ghousinnisa</i>	26
5.	<b>Trends, Issues and Challenges in Management Education</b> <i>- Vunnam Hari Babu, Dr. S. Venkata Subba Reddy</i>	38
6.	<b>Challenges in Management Education in India</b> <i>- Dr. J. Munnaiah, K. Subba Reddy</i>	47
7.	<b>Challenges, Issues and Opportunities in Management Education</b> <i>- Y. Mallikarjuna Achari, Dr. P. V. Varaprabhakar</i>	53
8.	<b>Content and Context of Management Education in India</b> <i>- Rachagundla Raja</i>	58
9.	<b>Current Scenario of Management Education in India</b> <i>- R. Sarveswara Reddy</i>	65
10.	<b>Trends Prevailing in Management Education in India</b> <i>- T. Jhansi Rani, P. Madhu Mala</i>	72
11.	<b>A Study on Management Education in India: Trends, Issues and Implications</b> <i>- K. Khasimpeera, Dr.M.Sugunatha Reddy</i>	78
12.	<b>Emergence of Case Study Method of Teaching in Management Education</b> <i>- L. Ramanjaneya</i>	93



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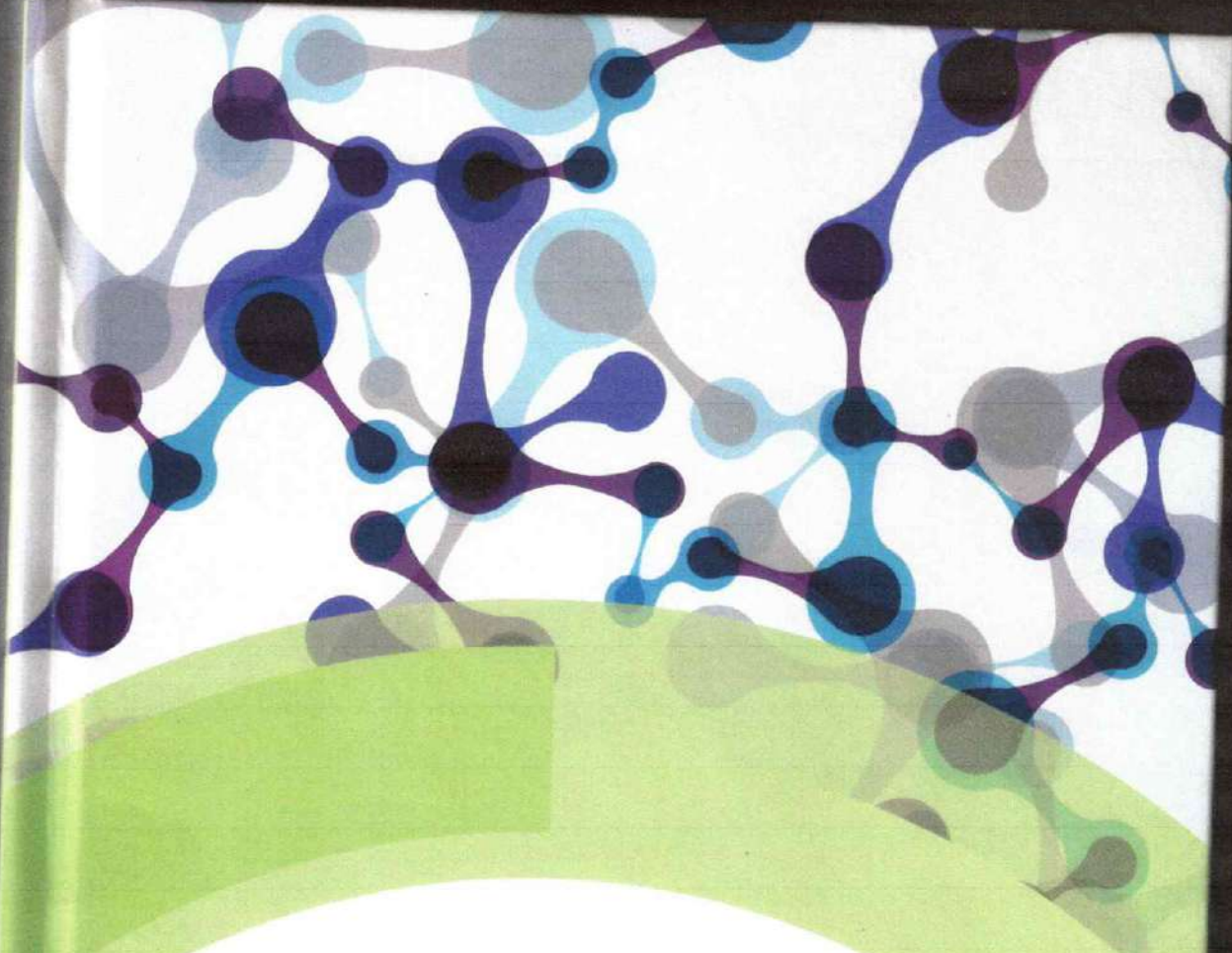
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246



Chemistry in the Environment

# Functional Hybrid Nanomaterials for Environmental Remediation

Edited by Ahmad Fauzi Ismail and Pei Sean Goh



## Preface

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Research and development with organic or inorganic materials in the field of environmental remediation by nanomaterials at the nanoscale has the potential and advantages of both. Over the past decades, tremendous efforts have been made to harness the potential of nanomaterials to address the limitations of conventional materials, including porous materials, play equally important roles in environmental remediation.

The main purpose of this book is to provide a state-of-the-art as well as a comprehensive synthesis and applications of functional hybrid nanocomposites for environmental remediation. The book consists of 11 chapters which cover various approaches to the synthesis as well as their applications. The first six chapters have been selected from the multidisciplinary work in the multidisciplinary applications. Various functional hybrid nanocomposites, antimicrobial, magnetic, and their applications to their synthesis and intended uses. Their applications to the removal of heavy metals and organic pollutants are also discussed.

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Chemistry in the Environment Series  
Functional Hybrid Nanomaterials  
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<i>Contents</i>	ix
3.6 Low-energy Ion Scattering (LEIS)	64
3.7 Dynamic Light Scattering (DLS)	65
3.8 Mass Spectrometry (MS)	65
3.9 Mechanical Properties	66
3.10 Morphological Characterization Method	67
3.10.1 Electron Microscopy	67
3.10.2 Spectroscopic Particle Size Analysis	74
3.11 Conclusion	75
References	76
<b>Chapter 4 Nanomaterials and Their Modification for Environmental Remediation</b>	<b>79</b>
<i>N. Lakshmana Reddy, Kiyoungh Lee, Yeon-Tae Yu, J. Theerthagiri and M. V. Shankar</i>	
4.1 Introduction	79
4.2 Nanomaterials for Environmental Remediation	80
4.3 Zero Dimensional (0D) Nanomaterials for Environmental Remediation	81
4.3.1 Doped 0D Nanomaterials	82
4.3.2 Composites of 0D Nanomaterials	85
4.4 1D Nanomaterials for Environmental Remediation	86
4.4.1 Doped 1D Nanomaterials	87
4.4.2 Composites of 1D Nanomaterials	89
4.5 2D NMs for Environmental Remediation	91
4.5.1 Carbon-based 2D NMs	91
4.6 Conclusions and Outlook	95
Acknowledgements	96
References	96
<b>Chapter 5 Polymer-based Nanocomposites for Environmental Remediation</b>	<b>101</b>
<i>Alireza Nouri, Siew Fen Chua, Ebrahim Mahmoudi, Satya Candra Wibawa Sakti and Wei Lun Ang</i>	
5.1 Introduction	101
5.2 Polymer-based Nanocomposite	103
5.2.1 Membranes	104
5.2.2 Adsorbents	110
5.2.3 Aerogels and Hydrogels	115
5.3 Conclusion	124
Acknowledgements	124
References	124

Chapter 3

Othman, H. Hasbullah, H and B. C. Ng, *Mater. Sci.*

Lee and Y.-W. Heo, *Scr.*

Abidin, S. Mansur, B. C. 16, 101372.

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A. H. D. Othman, H. Has- and F. Kamal, *Carbohydr.*

CHAPTER 4

## ***Nanomaterials and Their Modification for Environmental Remediation***

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### **4.1 Introduction**

Environmental pollution, global warming, and extreme contamination of water bodies around the globe lead to severe problems and challenges for mankind. Tackling these problems requires the development of nanotechnology and nanomaterials, which are emerging and active fields of research.<sup>1-3</sup> Nanotechnology is defined as the fundamental understanding of physiochemical properties of nanostructured materials and the fabrication and

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245

Shabir Hussain Wani  
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# Compatible Solutes Engineering for Crop Plants Facing Climate Change


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Shabir Hussain Wani  
Manu Pratap Gangola • Bharathi Raja Ramadoss  
Editors

Compatible Solutes  
Engineering for Crop Plants  
Facing Climate Change

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# Contents

<b>1</b>	<b>Recent Advances in Plant Adaptation to Climate Change – An Introduction to Compatible Solutes</b> . . . . .	<b>1</b>
	Muhammad Qudrat Ullah Farooqi, Zahra Zahra, Muhammad Afzal, and Muhammad Imran Ghani	
<b>2</b>	<b>Osmosensing and Signalling in Plants: Potential Role in Crop Improvement Under Climate Change</b> . . . . .	<b>11</b>
	Deepu Pandita and Shabir Hussain Wani	
<b>3</b>	<b>Amino Acids Other Than Proline and Their Participation in Abiotic Stress Tolerance</b> . . . . .	<b>47</b>
	Showkat Ahmad Ganie	
<b>4</b>	<b>Engineering Glycine Betaine Biosynthesis in Alleviating Abiotic Stress Effects in Plants</b> . . . . .	<b>97</b>
	Bidisha Bhowal, Prakash Chandra, and Saurabh C. Saxena	
<b>5</b>	<b>Improvement of Abiotic Stress Tolerance by Modulating Polyamine Pathway in Crop Plants</b> . . . . .	<b>129</b>
	Anshu Alok, Akshay Nag, Jitesh Kumar, Phanikanth Jogam, Kashmir Singh, and Sudhir P. Singh	
<b>6</b>	<b>Engineering Fructan Biosynthesis Against Abiotic Stress</b> . . . . .	<b>145</b>
	Gourav Choudhir and Neeraj K. Vasistha	
<b>7</b>	<b>The <math>\gamma</math>-Aminobutyric Acid (GABA) Towards Abiotic Stress Tolerance</b> . . . . .	<b>171</b>
	Vikas Srivastava, Sonal Mishra, Aksar Ali Chowdhary, Skalzang Lhamo, and Shakti Mehrotra	
<b>8</b>	<b>Sugar Alcohols and Osmotic Stress Adaptation in Plants</b> . . . . .	<b>189</b>
	Ramachandra Reddy Pamuru, Chandra Obul Reddy Puli, Deepu Pandita, and Shabir Hussain Wani	

## Chapter 8

# Sugar Alcohols and Osmotic Stress Adaptation in Plants



Ramachandra Reddy Pamuru, Chandra Obul Reddy Puli, Deepu Pandita,  
and Shabir Hussain Wani

**Abstract** Sugar alcohols or polyols are derivatives of sugars produced in high amounts during salt or drought (abiotic) stress in plants. A number of sugar alcohols identified in plants include manitol, sorbitol, D-ononitol, pinitol, adonitol, ribitol, glucitol etc., which are classified as cyclic and non-cyclic polyols. Osmoregulation is a phenomenon of regulating constant fluid osmotic pressure in cells through salt and water concentrations during abiotic stress conditions. In plants, abiotic stress induces water loss, and at the same time, they release osmolytes including sugar alcohols which maintains osmoregulation. Sugar alcohols play a crucial role in osmotic adaptations and exert tolerance to salt and drought stress in plants. Due to the importance of sugar alcohols in crop improvement its metabolism, osmotic adaptations and role of transformational studies are discussed in the present chapter.

**Keywords** Sugar alcohols or polyols · Drought · Salt stress · Osmoregulation · Transformation

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189

243

Cont. from previous flap

- 20. A Study on Knowledge, Attitude, and Practice of Reproductive Health among Adolescent Girls in Vijayapura
- 21. Unforeseen Emergencies and Community Resilience: A Social Identity Perspective
- 22. A Systematic Review of Yoga for Mental Health and Physical Health
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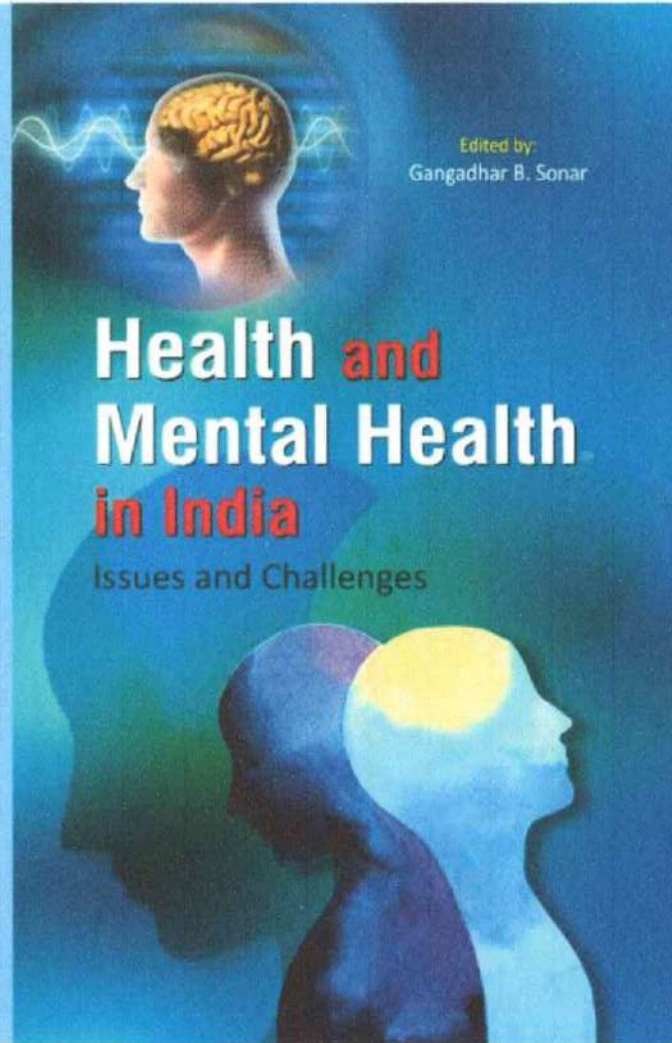


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**Health and Mental Health in India**

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**Contents**

1. Social Development Interventions for Village Development - A Case study of Vijaypur village
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5. A Study on Maternal Health Care in Rural Area: A Survey of Jamakhandi Taluk
6. Depression and Quality of Life in Elderly of Karnataka
7. Job Satisfaction among Social Workers in Health Settings
8. An Analysis of Socio-Economic Status of Elderly in India
9. Understanding Intersections of Democracy And Mental Health
10. Changing Roles and Challenges of the Social Workers in the Mental Health Service System
11. Gender and Mental Health: An Overview
12. Mothers Communication with Adolescent Girls Regarding Nutritional Intake during Adolescence: A Study in Bellary District of Karnataka
13. Social Determinants of Health and Medical Social Work
14. Gender Discrimination and Elderly Women
15. Life Conditions of the Elderly During Covid-19 Pandemic
16. Awareness on Antenatal Care Services among Pregnant Women in Rural Kalaburagi
17. A Study on Health Issues of Paurakantikas
18. A Study on Women Empowerment Through Education in Vijayapura District
19. Socio-Economic And Educational Status Of Theables In Vijayapur City

Cont. to next flap

## An Analysis of Socio-economic Status of Elderly in India

■ Dr. K. Lalitha\*

### Abstract

Elderly or old age consists of ages nearing or surpassing the average life span of human beings. The policy defines 'senior citizen' as a person who is 60 years old and above. It strives to ensure that the well-being of senior citizens and improve quality of lives through providing specific facilities, concessions, relief, services etc. and helping them cope with problems associated with the old age. The 60 odd million elderly in India are suffering from the consequences of a dwindling joint family system, an increasing outmigration of caring children and increasing dual careers in nuclear families. Many of the elderly are close to poverty line and live in rural areas. State care of the elderly is cost prohibitive. In view of the increasing need for intervention in area of old age welfare, Ministry of Social Justice and Empowerment, Government of India adopted 'National Policy on Older Persons' in January, 1999. The policy provides broad guidelines to State Governments for taking action for welfare of older persons in a proactive manner by devising their own policies and plans of action. Empirical studies of the elderly in the contemporary Indian society showed that most of the elderly felt alienated, marginalized with depletion of status and power. This paper outlines the status of elderly, socio-economic factors and discuss about productive issues of ageing and how to empower them by using tailored to the situation prevailing in India.

**Key Words:** Elderly, graying population, Socio-Economic status, Empowering elderly, NPOP.

### Introduction

Elderly or old age consists of ages nearing or surpassing the average life span of human beings. The boundary of old age cannot be defined exactly because it does not have the same meaning in all societies. Government of India adopted 'National Policy on Older Persons' in January, 1999. The policy defines 'senior citizen' or 'elderly' as a person who is of age 60 years or above. The United Nations World Assembly on Ageing, held at Vienna in 1982, formulated a package of recommendations which gives high priority to research related to developmental and humanitarian aspects of ageing (United Nations, 1987). The plan of action specifically recommended that "International exchange and research cooperation as well as data collection should be promoted in all the fields having a bearing on ageing, in order to provide a rational basis for future social policies and action. Special emphasis should be placed on comparative and cross-cultural studies in ageing". The phenomenon of population ageing is becoming a major concern for the policy makers all over the world, for both developed and developing countries, during last two decades.

**Elderly in ancient times:** The elderly is considered as head of the family from the generations. The elderly in the ancient times considered as resource. In the Vedic-Puranic Period (B.C), they are revered and respected and considered as store house of wisdom. And society used to consider them as resource and perceives them as "One who has usable skills or assets" for benefit of others. In the post-manu period (150-300 A.D) the old age got prominence by giving priority in the four stages-prescribed roles, duties and obligations. The four Asrama Dharmas- Balya, Brahmacharya (education), Grihastha (Raise Families) and Vanaprastha (Advisor / Counselor Detachment) and Sanyasa (Renunciation). It is a fact that majority of the older people are still living in rural areas and Family system is the backbone for Indian society. Traditionally, Patriarchal Family in India is existing and the family roles and gender relationships are within this system. This is true in all family system except the matrilineal system of the nayar castes in Kerala. In a Indian traditional family system a woman must obey her father, then her husband, and then her son which is normal pattern as she goes through her. She don't have any independent role to play (Jamuna, 2003; Ramamurti & Jamuna, 1983b).

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# RNA-Based Technologies for Functional Genomics in Plants

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<b>10</b>	<b>Improving Nutrient Value of Crops: Applications of RNAi in Targeting Plant Metabolic Pathways</b> .....	199
	Sarbajit Chakrabarti, Chanchal Chatterjee, and Arunava Mandal	
<b>11</b>	<b>Gene and Genome Editing with CRISPR/Cas Systems for Fruit and Vegetable Improvement</b> .....	227
	Semih Arbatli, Julia Weiss, and Marcos Egea-Cortines	
<b>12</b>	<b>Principles and Applications of RNA-Based Genome Editing for Crop Improvement</b> .....	247
	M. Nagaraj Kumar, V. V. Santosh Kumar, Archana Watts, and Viswanathan Chinnusamy	
<b>13</b>	<b>CRISPR-Cas12a (Cpf1) and Its Role in Plant Genome Editing</b> .....	279
	Jonathan Windham, Shailendra Sharma, Manoj Kumar Kashyap, and Sachin Rustgi	
<b>14</b>	<b>CRISPR/Cas13: A Novel and Emerging Tool for RNA Editing in Plants</b> .....	301
	Deepu Pandita, Chandra Obul Reddy Puli, and Sudhakar Reddy Palakolanu	
<b>15</b>	<b>Mutagenomics for Functional Analysis of Plant Genome using CRISPR Library Screen</b> .....	339
	Nidhi Dongre, Divyani Kumari, Binod Kumar Mahto, Sagar Sanjay Arya, and Sangram Keshari Lenka	
<b>16</b>	<b>CRISPR/Cas9 System, an Efficient Approach to Genome Editing of Plants for Crop Improvement</b> .....	369
	Saber Delpasand Khabbazi, Afsaneh Delpasand Khabbazi, Volkan Cevik, and Ali Ergül	
<b>17</b>	<b>Utilizing RNA-Based Approaches to Understand Plant-Insect Interactions</b> .....	393
	Sarbesh Das Dangol, Muneeb Hassan Hashmi, Faisal Saeed, Ilknur Yel, Alperen Öztürk, and Allah Bakhsh	

# Chapter 14

## CRISPR/Cas13: A Novel and Emerging Tool for RNA Editing in Plants



Deepu Pandita , Chandra Obul Reddy Puli,  
and Sudhakar Reddy Palakolanu

**Abstract** Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) and CRISPR-associated protein (Cas) act as an adaptive immune system against invading nucleic acids and bacteriophages in bacteria and archaea. Based on the constitution of effector protein, CRISPR/Cas is broadly divided into multiple types and subtypes. Among these, type VI CRISPR/Cas system is of special attention with four subtypes, namely, VI-A, VI-B, VI-C, and VI-D, and are believed to have evolutionary origin from transposons. These subtypes exhibit variations in structural architecture and mechanism and have diverse Cas13a (C2c2), Cas13b1 (C2c6), Cas13b2 (C2c6), Cas13c (C2c7) and Cas13d effector proteins. CRISPR/Cas13 ribonuclease processes pre-crRNA to mature crRNA which targets and knockdown single-stranded RNA of phage genome during viral interference. The high specificity RNA guiding and RNA-targeting capacity of this protein enables to fuse with several effector molecules, opening new avenues in the field of Cas13-mediated RNA targeting, tracking, and editing. CRISPR/Cas13 has a unique feature of targeting RNAs including plants, so it can be used as a new tool for engineering interference against plant pathogens including RNA viruses, with better specificity and for other RNA modifications in plants. Fluorescent probe-tagged deactivated programmable Cas13 proteins could be used as an alternative tool for *in vitro* RNA studies. The engineered Cas13 can also be used for programmable RNA editing. The high target specificity, low cost, and user-friendly operation of CRISPR/Cas13 make this an effective tool for several RNA-based research studies and applications. Therefore, the focus of this chapter is upon classification of CRISPR/Cas system, structural and functional diversity of type VI CRISPR/Cas system including its discovery and origin, mechanism, and role of Cas13 in RNA editing of plants.

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## Chapter 17

# Chitosan Nanoparticles: An Overview on Preparation, Characterization and Biomedical Applications



Arundathi Mesa, Grace Sugandha Sowjanya Mythatha, Rathna Silviya Lodi, Sudheer Ravuri, and Ramesh Balli

**Abstract** Chitosan (CS) and Chitosan nanoparticles (CNPs) have multifaceted applications in medicine, agriculture, pharmaceuticals, tissue engineering, waste water treatment and food industries. CS is recognized as a less or non-toxic, biocompatible polymer by US Food and Drug Administration (FDA) for wound dressing as well as in dietary application. The properties of CS have upgraded by making their nanoparticles. Due to their exceptional properties including nanosize with large surface area to volume ratio, presence of reactive groups ( $-NH_2$  and  $-OH$ ), cationic nature ( $NH_3^+$ ), bioadhesivity, biocompatibility, bioavailability and biodegradable nature; CNPs are explored in many ways in biomedical filed as an antimicrobial agent, wound healing agent, scaffolds for tissue engineering, anti-tumour agent in cancer therapy, carriers for gene and drug delivery, etc. In this chapter we highlight on CNPs preparation, characterization and certain important biomedical applications.

**Keywords** Chitosan (CS) · Chitosan nanoparticles (CNPs) · Scanning electron microscopy (SEM) · Transmission electron microscopy (TEM) · Tripolyphosphate (TPP)

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A. Mesa · G. S. S. Mythatha · R. Balli (✉)

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393

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# Impact of COVID-19 on the Migrant Labour in India

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## CONTENTS

Sl. No.	Paper Title	Page
1	Impact of Covid-19 Lockdown on MSMEs in Kadapa District : <b>Mr.K.Khasimpoora and Prof. S. Raghunatha Reddy</b>	1
2	Impact of coronavirus pandemic on Indian MSME Sector: <b>S.Raghunatha Reddy &amp; M.Murali</b>	6
3	Impact of Covid-19 on Hospitality Industry in India : <b>Rama Durga Sirisha Reddy &amp; K.Yamuna</b>	10
4	Health challenges of Internal Migrant Workers during COVID-19 Pandemic: <b>T.V. Ramana</b>	14
5	Impact of Covid-19 on Indian Agriculture : <b>K. Harika</b>	19
6	Constitutional Provisions of Migrant Labour in India : <b>M. Nani Babu</b>	24
7	Reverse Migration in India due to COVID – 19 with special reference to MSMEs: <b>M. Venkateswara Rao &amp; P. Lakshmi Narayana</b>	28
8	Mutual Funds in India: Challenges and Opportunities: <b>Rama Durga Sirisha Reddy &amp; Lakshmi Bandi</b>	33
9	Impact of COVID-19 on unorganized Labour in India: <b>Subbaiah Borugadda</b>	39
10	Impact of COVID -19 on Indian Agriculture Labour: <b>Geddani Pavan Kumar</b>	46
11	A Brief Study on impact of Covid-19 on Various Sectors: <b>K. Sarada</b>	51
12	Labour Migrants of India Their Struggle for Health during COVID 19: <b>Vijaya Santhi Matha &amp; Yandamuri Ayyanna</b>	57
13	Impact of Covid-19 on the Migrant Labour in Health Hygiene and Hazards of Viral Spread: <b>MSK Krishna Jyothi</b>	60
14	Impact of COVID – 19 Pandemic on unorganised Sector in India: <b>Ch. Ramana Rao</b>	62
15	Indian migrant workers during the COVID-19 pandemic: <b>S.Priskilla</b>	68
16	Theoretical Approach to Spread control of COVID-19 by Mathematical Modeling: <b>A.Ch.Sravanthi, I.Sai Deepika &amp; P.Akhila Tejaswini,</b>	72
17	Impact of Covid-19 on Tourism and Travel Industry in India: <b>S. B. Anil Kumar</b>	75
18	COVID-19 Changes in Social Economic, Family and Life Style: <b>K.Rajani &amp; S.V.G.V.A.Prasad</b>	78
19	Impact of Migration Labour Due to Global Covid-19 Pandemic in India: <b>K.Swamiji, Thammana. Sandeep, Gangalakurthi and Kotinagavara Prasad</b>	80
20	Impact of Covid-19 on various Sectors of the Indian Economy: <b>K. Hari Babu &amp; Joseph Steephen Kommara</b>	86
21	Impact of Covid-19 on Education System: <b>D.V.S.Viswanadha Raju, G.Durga Bhavani, A. Deepthisri &amp; Ch.Tejasri</b>	91

## Impact of Covid-19 Lockdown on MSMEs in Kadapa District

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### ABSTRACT

The outbreak of Covid-19 is the giant disasters in the history which is devastatingly impacting on the country's economy. This article means to survey the effect of COVID-19 episode on these business misfortunes and make due through the emergency. The lockdown significantly influenced the assembling exercises and the production network, due to the closure of transportation and limitations on imports, fares and assembling. In India limited scope businesses are more weak ones as it severely harmed due to Covid-19 and the resultant lockdown. The lockdown due to Coronavirus has brought Micro, Small and Medium Enterprises (MSMEs) to its knees by halting the business which evaporated the income. To see profoundly about MSMEs, it is directed a pattern investigation of miniature, little and medium business visionaries in provincial and metropolitan zones of Kadapa area of Andhra Pradesh. The information needed for the examination have been gathered both essential and optional sources. The scientists have directed the survey with the 142 example business people. The outcomes show that a large portion of the partaking ventures have been seriously influenced and they are confronting a few issues, for example, Loans and Risk receipts and Risk of installments of the client and the Micro, little and medium undertakings assortment of the Primary information.

**Keywords:** COVID-19, MSMEs, Lockdown, Risk of Receipts and payments.

### Introduction

The Micro, Small and Medium Enterprises (MSME) sector in India has emerged as a highly vibrant and dynamic sector of the Indian economy over the last five decades. It is playing a significant role in the economic and social development of the country by fostering entrepreneurship and generating large employment opportunities at comparatively lower capital cost than large industries. It established both rural, urban and backward areas, inter alia, reducing regional imbalances, assuring more equitable distribution of national income and wealth. As MSMEs absorb the surplus agricultural labour, they help reduce the problem of disguised unemployment in rural areas. MSMEs are also complementary to large industries as ancillary units and also play an important role in the whole eco-system of the secondary and tertiary sector. The MSMEs are widening their domain across sectors of the economy, producing diverse range of products and services to meet demands of domestic as well as global markets.

The MSMEs in India are approximately 6.3 crore. The MSMEs in India contributes about 29 per cent towards the GDP through its national and international trade. According to data shared by the MSME Minister in the Rajya Sabha, the registered MSME is dominated by micro enterprises at 22.06 lakh (2.2 million) units in 2020 from 18.70 lakh (1.8 million) units in 2019, while small enterprise units went up

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## Emerging Paradigms in Teaching English Language and Literature (NCEPTELL-2020)

50	Ruth Sara Philip	Blended learning	274-277
51	D. Vijaya Lakshmi & K. Ratna Shiela Mani	Water as a Symbol in the Novels of Paulo Coelho – A Select Study	278-282
52	Dr. Mutyala Suresh	Teaching Business Vocabulary to Undergraduate Technical Students: A Critical Review	283-289
53	Dr. Seema Devi	L2 Acquisition: A Pathway to Global Communication	290-296
54	P.Kousaru Basha, Dr.Y.Suneetha & Dr.V.B.Chitra	Feedback Mechanism in a Reading Class– An Instrumental Tool	297-303
55	D. Sai Lakshmi, Dr. S. ShanmugaPriya & Dr. V.B. Chitra	Learning & Teaching Language through Literature	304-310
56	Dr. Raji Ramesh	Facets of Technology Assisted English Language Teaching And Learning	311-316
57	B. Kesava Reddy, Dr. K. GopalReddy & Dr. V.B. Chithra	Activities in CLT to Enhance Conversational Skills in English Among UG Students(Non- Professional)	317-326
58	A.Kameswari & Dr.V.B.Chithra	Impact of Culture in Advertising: A critical Study	327-333
59	SalomanRajuYarlagadda	The Role of Information and Communication Technology (ICT) in English Language Teaching	334-338
60	Mr. Ramu Yarlagadda & Dr. Mantri Venkata Raghu Ram	Mind Mapping: One of the Best Titanic Tools for Learning and Teaching	339-345
61	D.R. Jayaraman	The Phonetic Connect and Disconnect	346-348
62	Dr. D. Sravana Jyothi & Dr. Shakila Bhanu Shaik	The Effectiveness of Using Blended Learning in Teaching and Learning Modern Educational Technology	349-354
63	Dr. R.V. Jayanth Kasyap	Visual Pleasure in Shakespeare's Film Adaptations with Special Reference to Vishal Bharadwaj's Omkara.	355-359

## **Visual Pleasure in Shakespeare's Film Adaptations with Special Reference to Vishal Bharadwaj's Omkara.**

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### **Abstract**

*Shakespeare the unparalleled monarch in the realm of dramatic world is best remembered for his stupendous contribution not merely to the literary world but for his philosophical, spiritual and psychological insights present in his plays. The bard who wrote for pleasure influenced the world touching upon different aspects of the life and its facets . His dramatic art has been optimally explored by movie makers and the cinematic treatment enhanced the worth and value of his plays. It is easy to fathom the depth of his artistic talent in his works but a few skillful artists of the glamorous world of films have been successful in unveiling Shakespeare's plays on the celluloid with utmost talent and creative ability . The present paper titled **Visual Pleasure in Shakespeare's film adaptations with Special Reference to Vishal Bharadwaj's Omkara** brings into context the directorial talent and success in adapting Shakespeare's play *Othello* , a tragedy packed with emotional intensity. The film which was produced in 2006 received adequate critical acclaim.*

### **Introduction**

William Shakespeare, a creative genius, who reigned the kingdom of dramatic art and who continues to inspire the connoisseurs of art and literature needs no special introduction. Introducing him is placing mirror before the Sun for his uniqueness in terms exemplary contribution to the world of letters and creative output he is best remembered . His plays touch upon every aspect of life and its different facades. They are not without spiritual and philosophical content. Every emotion of life is presented in rich and vivid terms reflecting his deep insight about human behavior. The treasured utterances from his plays are oft quoted and embellishing every discourse. Film makers have been successful to explore his plays by lending them cinematic treatment bringing enriched grace to his dramatic talent. Most of the film adaptations of Shakespeare have received tremendous success artistically as well as commercially. It is certainly a massive task to adapt a play and tune it for the celluloid.

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9.3.4	Perovskite Solar Cells	280
9.3.5	Photonic Crystals	281
9.4	Polymer Nanocomposites	282
9.4.1	Natural Polymers	284
9.4.2	Natural Biopolymer	284
9.4.3	Chitin and Chitosan	285
9.4.4	Preparation of Nanochitosan	286
9.5	Fabrication of Solar Cells	286
9.6	Spectroscopic Characterization and Evaluation	287
9.6.1	Fourier Transform–Infra-Red Spectroscopy (FT-IR)	288
9.6.2	Transmission Electron Microscopy (TEM)	289
9.6.3	Scanning Electron Microscope (SEM)	289
9.7	Conclusion	290
<b>10</b>	<b>Green Chemistry Assisted Synthesis of Metallic Nanomaterials Applications</b>	<b>295</b>
	<i>Devi Radhika and Karthik Kannan</i>	
10.1	Introduction	296
10.2	Importance of Metallic Nanomaterials	297
10.3	Production of Various Metallic Nanomaterials Using Green Chemistry	298
10.4	Metallic Nanomaterials in Environmental and Biological Applications	300
10.4.1	Photocatalytic Performance	301
10.4.2	Antibacterial Activity of Metallic Nanomaterials	302
10.4.3	Anticancer Activity of Metallic Nanomaterials	307
10.5	Conclusions, Outlook and Perspectives	309
<b>11</b>	<b>Preparation of Metal Nanoparticles Extractions from Green Natural Products</b>	<b>315</b>
	<i>Muthukumar Harshiny, Sekar Aiswarya Devi, Manickam Matheswaran, and Muthukonda V. Shankar</i>	
11.1	Introduction	316
11.2	Classification of Nanomaterials	318
11.2.1	Nanoparticles	319

## Chapter 11

# Preparation of Metal Nanoparticles Extractions from Green Natural Products

**Muthukumar Harshiny,<sup>a</sup> Sekar Aiswarya Devi,<sup>b</sup>  
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Metal nanoparticles (MNPs) are novel and inspiring material with unique traits and various applications. Multifunctional MNPs can be prepared using physicochemical and biological methods. Though, exploiting physicochemical routes requires high energy, and cost, it also leads to environmental damage via harmful chemical solvent utilization, consequently rising noxiousness and health concerns. In this regard, green extract mediated synthesis of MNPs has recently arisen as an eco-friendly method for synthesizing MNPs. Importantly covered, synthetic processes of MNPs using green natural products alike plant extracts and micro-organisms such as algae, bacteria, fungi, etc. Besides, the various parameters like

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244  
226

3

## Salinity Problems in Groundwater and Management Strategies in Arid and Semi-arid Regions

Balaji Etikala<sup>1</sup>, Narsimha Adimalla<sup>2</sup>, Sughosh Madhav<sup>3</sup>, Srinivasa Gowd Somagouni<sup>4</sup>, and P.L. Keshava Kiran Kumar<sup>4</sup>

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### 3.1 Introduction

Salinity is a major social, economic, and environmental menace in climates with low rainfall and high evapotranspiration (Jabbar and Chen 2008; Abuelgasim and Ammad 2018). In general, the surface water supply in arid and semi-arid climates is scarce, which shifts the attention of policymakers to groundwater. Groundwater in these regions is very limited and considered a major resource for sustaining terrestrial ecosystems (Balaji et al. 2019a, b; Huang et al. 2019). In addition, intense urbanisation, demand for freshwater due to an increase in population, and poor management strategies have generated additional stress to this limited resource which leads to lowering groundwater levels (Cosgrove and Loucks 2015; Nagaraju et al. 2016). Therefore, people dig bore wells to great depths for groundwater that are basically rich in soluble salts (Miglietta et al. 2017; Akinlalu and Afolabi 2018). Among complex environmental issues such as droughts, heavy blowing winds, heatwaves, and floods, salinity is also a major issue. It turns soils and irrigated land more saline, which impairs crop growth and leads to low production and land degradation (Shrivastava and Kumar 2015). Moreover, salinity is a serious public health concern and its consequences are seen mostly in coastal drylands. Consuming a higher amount of salt increases blood pressure, which increases the risk of cardiovascular disease that induces heart stroke and attack. Nowadays, it accounts for a large number of deaths worldwide. Among various direct and indirect sources, salinity is one of many serious issues that affect the hydrological cycle in terms of water quality deterioration (Pulido-Bosch et al. 2018). In urban landscapes (non-agricultural lands) it affects the structures by subsidence, corrosion, and water quality deterioration. All these practices result in the loss of arable lands that affects terrestrial habitats, particularly in

225 243

# MANAGEMENT EDUCATION IN INDIA: ISSUES & CHALLENGES



*Editors*

**Dr. S. Subba Reddy**

**Dr. A. Amruth Prasad Reddy**



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*Dr. B.R. Ambedkar*

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**Mechanisms Involved in Microbes and Heavy metal Interactions in Bioremediation****G. Mary Sandeepa<sup>1</sup>, M. Madakka<sup>2\*</sup>**

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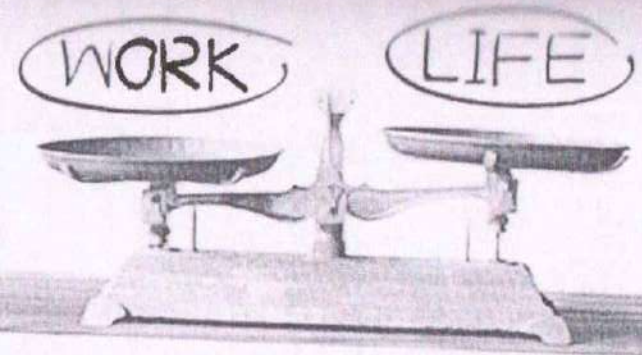
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**Abstract:** Anthropogenic activities raises pollutants in nature which is becoming a serious threat to all life forms. Elimination of pollutants at contaminated place is very important for safe ecosystem. Simultaneously removal of contaminants is attractive scheme for their remediation. Many conventional techniques are used as treatment solution, but they are not attractive due to different parameters. Now a days the novel, cost effective and ecofriendly technique is using the microorganisms. They take part a very important role in bio geochemical cycles and bio transformations, decomposition, mineral and metal transformations, bio weathering and sediment formation. Microorganisms have different mechanism which can effect changes in metal toxicity, mobility, speciation, mineral deterioration, dissolution and formation. These mechanisms play a crucial role in cycling of metals and elements which are associated with soil, rocks and minerals. Microbial mechanisms involve active efflux or sequestration with insoluble compounds or proteins, through which they may detoxify or metabolize the heavy meals like Zn, As, Cd Ni, Pd, Hg. This book chapter explains about the chemistry involved in different metal microbe interaction.

**Key words:** Microbes, Heavy metals, Environment, Bioremediation.

...that includes employees as well as employers and their families. The dual responsibilities can increase stress, compromise physical and emotional health and lead to burnout and lower work productivity. Though a number of books are available in these areas, it is very difficult to find a textbook covering all these aspects in one book meeting the imperative need to bring out a suitable book tailored to meet specific requirements of students, research scholars and employees in the service sector. With this basic objective, our study has been conducted a study on the work-life balance of women employees in APSRTC in the Rayalaseema region of Andhra Pradesh. The present book critically examines the various issues related to the impact of occupational stress and gender disparity on women employees of APSRTC in the Rayalaseema region in A.P., India.

OF WOMEN



**Author's Name:** ...  
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**Work-Life Balance of Women**

LAP LAMBERT



19

## Recent advances in Effective Remediation of Groundwater Fluoride

V. Sunitha\*

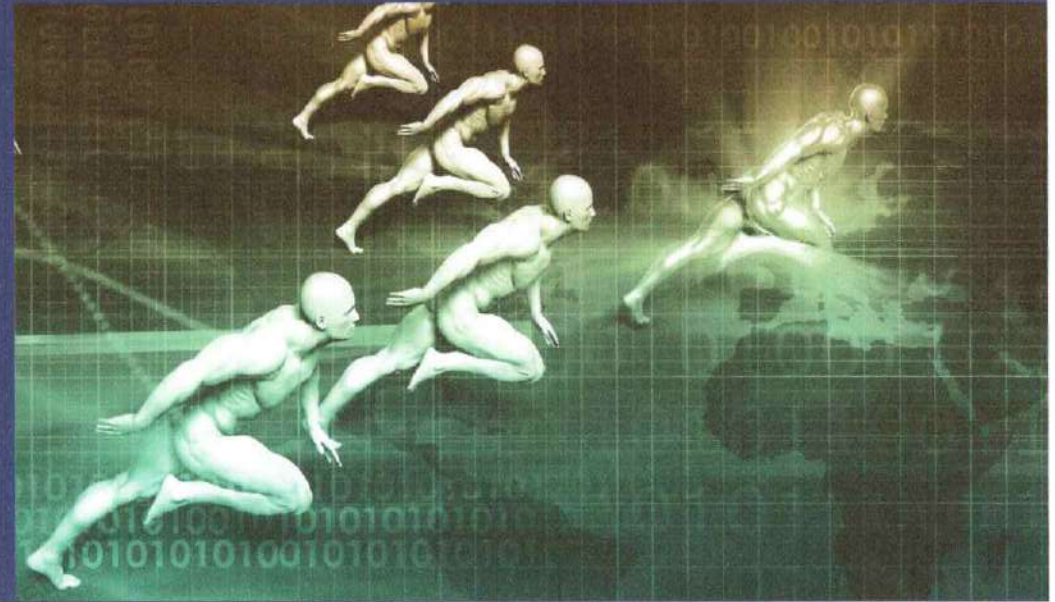
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**Abstract:** Fluoride is generally referred to as a double-edged sword as dental caries are related to dental caries, but enormous intake causes dental and skeletal fluorosis. Fluoride in ground water comes due to dissolution of natural minerals in the rocks, soils into which water interacts. Toxic fluoride concentration in drinking water is noted in several areas around the world and millions of people depend on groundwater with range of concentrations exceeding the World Health Organization (WHO) guideline level of 1.5 mg/L. In India, 65 million individuals are believed to be affected by endemic fluorosis. With a proposal to resolve the problem, the Rajiv Gandhi National Drinking Water Mission has been established to monitor fluorosis. Nalgonda technique, Prasanti activated alumina technology, UNICEF in India using defluoridation based on households have been developed. A simple and economical domestic defluoridation process was developed by various researchers on the basis of findings and comprehensive investigations. This paper seeks with recent techniques on defluoridation studies using traditional and unconventional materials and to compile the various pros and cons of these defluoridation techniques, including prashanti activated alumina technology, membrane method, water treatment residues (WTR),  $\text{Fe}_3\text{O}_4/\text{Al}_2\text{O}_3$  nanoparticles adsorption using red mud, clay, bauxite, clay, *Mentha longifolia*.

**Key Words:** Emerging trends, Defluoridation, Ground water, Fluorosis, India

The concept of leadership is a very ancient origin. In today's fast-changing world, leadership issues are getting increasingly important in organizations both at policy and implementation levels. The key to the progression of leadership is the need to coordinate the efforts of a group. The person who coordinates the group's effort is called the leader, and the behavior of the leader towards the members of the group (followers) is his leadership style. Thus, leadership is an interpersonal relationship between the leaders and followers. Leadership style is the result of philosophy as well as the personality and experience of leaders. It depends upon the nature of the tasks, type of followers, conditions prevailing in the organization, etc. Leading is a very human activity, as diverse and robust as any other activity. Each and every leader has his/her own style. Therefore, there are as many leadership styles as there are leaders.



PERAM VENKATA NAGARJUNA REDDY  
Gundluru Haranath



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NAGARJUNA REDDY, Haranath

# Leadership Perspectives

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# JOB STRESS AND ITS MANAGEMENT AMONG IT PROFESSIONALS

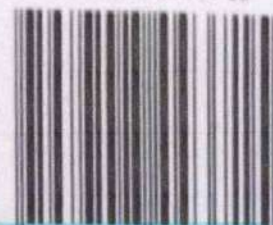
LAZAR VEPARALA

This book is to bring the life styles of the computer software professionals where the world is ruled by technology, where they are undergoing stress which really causes their health. Some of them are using coping mechanisms to cope with the stress, some of them are using their emotional intelligence to balance their lifestyle situation, some of them are using sense of control to overcome the given adverse situations in their currier and some of them are went to peek stage to burnout their stress



Dr.LAZAR VEPARALA working as Assistant Professor, Department of Psychology, Yogivemana University Kadapa, 516005, Andhra Pradesh INDIA. He did his research work under the guidance of Dr.SUSHASREE Professor of Psychology, Department of psychology, Sri Venkateswara University, Tirupathi, Andhra Pradesh, INDIA. she is the one who made him an instrument to sound. Area of Interest is Organizational Behaviour and Health Psychology. He published 9 research articles in National and International journals. He acted as a resource person in various workshops and conferences.

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## 8

## CHAPTER

## Diversity and Distribution of Lichens in Andhra Pradesh including two new records for India

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### ABSTRACT

The present paper enumerates 103 species from Kurnool district of Andhra Pradesh belonging to 41 genera under 22 families including two new records to India viz. *Caloplaca obscurella* (J. Lahm) Th. Fr. and *Porina subargillacea* Müll Arg. and also the district includes 20 new distributional records to Andhra Pradesh while 17 species were found endemic to India. Among the 22 families the district includes 2 new distributional records of lichen families Thelenellaceae and Monoblastiaceae with the genera *Thelenella* and *Anisomeridium*. Among the different growth forms, the crustose lichens exhibited the maximum diversity represented by 67 (65%) species followed by 21 (20%) foliose, 13 (13%) squamulose and 2 (2%) species of leprose lichen. Based on their habitat the corticolous lichens exhibited the maximum diversity represented by 56 (54%) species followed by 46 (45%) species of saxicolous and single (1%) species of terricolous. The member of lichen families Caliciaceae, Lecanoraceae and Teloschistaceae shows their maximum diversity in the district represented by 16, 13 and 10 species. Among the 41 genera the *Lecanora* and *Caloplaca* exhibit maximum diversity represented by 13 and 10 species. The crustose species *Caloplaca poliotera* (Nyl.) Stein. and a squamulose species *Peltula euploca* (Ach.) Poelt found growing luxuriantly on the exposed rock represented by single species each from 7 localities. Out of 14 localities surveyed in the district, Ahobilam forest and Kolanubharathi represents the maximum diversity of lichens with 29 and 28 species. Brief descriptions of both the new records are provided with microphotographs and their world distribution.

**Keywords:** Diversity, Eastern Ghats, Nallamalla Forest, South India, Taxonomy.

### INTRODUCTION

Kurnool district is one of the 13<sup>th</sup> districts in Andhra Pradesh (Fig.1) well known for its Nallamalla reserve forests which considered as part of the Eastern Ghats with hot

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209



## Byproduct Valorization of Vegetable Oil Industry Through Biotechnological Approach

8

Kumaraswamy Hanumegowda Hosur, Usha Kiran Betha, Kamlesh K. Yadav, Madakka Mekapogu, and Brijendra Kumar Kashyap

### Abstract

Vegetable oil industry produces oil cakes or meals as byproducts after the expulsion and/or extraction of oil from oleaginous materials including oilseeds. The oil cakes or meals can serve various needs of humankind once utilized properly not only in the form of food, feed, and/or concentrated manures but also as sources of various nutraceutically, pharmaceutically, and/or industrially important compounds or phytochemicals. The presence of protein, mineral, and special constituents in oil cake or meal makes it an important component of food and/or feed formulations, provided it is enabled by scientific and technological information and methodologies and supported by enabling policy ecosystem. In this context, there exists a need to review the latest literature on various technological approaches for the valorization of the byproducts of vegetable oil industry. The present chapter is an attempt to bring to the readers an up-to-date and comprehensive information on research and technology in the area of utilizing vegetable oil cakes/meals by way of harnessing the nutritional components and alleviating the problems of antinutritional and/or toxic (or poisonous) components. Though various approaches are discussed, a special emphasis is

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167



## Eco-friendly Microbial Biofuel Production from Waste

4

Mekapogu Madakka, Nambi Rajesh, Nadimikeri Jayaraju, Ballari Lakshmana, Hosur Hanumegowda Kumaraswamy, and Brijendra Kumar Kashyap

### Abstract

The rapid consumption of liquid fossil fuels not only causes depletion of energy source but also gives rise to the pollution problem of air, land and water increasing greenhouse gases which is concerned with climatic changes like global warming which in turn raises the sea level. An eco-friendly alternative of energy, i.e. biofuel, is required, which is a promising technology as it reduces the problems of production of eco-friendly energy, zero CO<sub>2</sub> emission and cost-effective fuels. This makes it of high demand across the world over conventional fuels. Scientists are concentrating on biomass-based biofuels, especially agricultural biomass and wastes which can transform into liquid biofuels with the versatile use of microbes. Production of renewable energy biofuels with the versatile utilization of microbes from the biological waste and biomass can reduce this threatening concern to a massive extent. Over the past few years, there has been a steady increase in the use of microbes as they have diversified metabolic activity, which enables substantial biofuels production utilizing different substrates. For the production of ethanol, bacteria utilize sugars, and cellulolytic microbes utilize substrates which are driven from plants. Atmospheric CO<sub>2</sub> is

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83

225  
201

## Dietary methyl farnesoate, a potential growth inducer in male crab *Oziothelphusa senex senex*

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**Abstract.** Insect juvenile hormone-like compound methyl farnesoate (MF), identified through 'reverse endocrinology' in crustaceans is a sesqui-terpenoid and plays crucial role in growth well proved by direct administration into the animals at laboratory conditions. However, these studies are not reached to the cultural ponds. Moreover, dietary supplementation of MF and its effects on growth in crustaceans is still at infancy. The present study tested MF (concentration of  $10^{-9}$ ,  $10^{-8}$  and  $10^{-7}$  moles/crab added to commercial shrimp pellet diet) in the growth of male crab *Oziothelphusa senex senex* (Oss) supplemented every alternative day for about 40 days. Along with experimental group control and eyestalk removed (ESX) groups are maintained. Dietary MF induced significant enhancement in the growth of male crab. The most effective group MF  $10^{-8}$  moles/crab supplemented. The frequency of growth induction found in this study is MF  $10^{-8} > 10^{-9} > 10^{-7}$  moles/crab  $\leq$  ESX and molted percentage is 27.5%, 17.5%, 10%, 10% in each group, respectively. The dietary supplementation of MF effective in inducing growth in cultured crustaceans thereby increases the yield of crustacean protein.

### 1. Introduction

Crustacean aquaculture industry plays crucial position in producing quality protein in agriculture. The flavour, deliciousness and limited availability of crustacean protein made it as one of the precious proteinaceous food on the globe. The worldwide production of crustacean protein facing many problems/difficulties. Methods are in pipeline to produce quality protein by inducing growth in culture species. One of such common technique followed to induce growth is traditional eyestalk ablation (ESX), where one-sided (unilateral) or two-sided (bilateral) eyestalk ablation tests were conducted [1]. Consequently, ablation of eyestalk triggers ecdysteroid secretion from Y-organ thereby induces precocious molting and tested in many decapods [2-4]. Although, ESX induces molting effectively in Aquaculture species, but it has its own limitations. ESX endorses with mortality owing loss of large amount of hemolymph and causes mortality. A few alternatives are in search alongside ESX and one of the best methods to improve crustacean protein identified in many studies using growth regulating hormone(s) manipulation. A process where exogenous molecules/chemicals exposed to the test animal for its growth enhancement called endocrine manipulation. Crustacean growth has been manipulated using a list of internal and external endocrine modulators [5-7].



206

206

204

# Emerging Trends in Nanotechnology Innovations, Health and Risks

S. Janardana Reddy

AGROBIOS

# Biogenic Nanoparticles: A Comprehensive Review to Explore Multidrug Resistance Mechanisms among Microbes

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## ABSTRACT

Microbial resistance has been an intense hindrance in preventing diseases for many decades. The rapid emergence of resistance towards several antibiotics could help the bacteria to become stronger to the existing antibiotics and becoming fatal to the mankind. This multidrug resistance is paving a challenging threat to human beings globally due to indiscriminate use of synthetic antibiotics and several other chemical compounds. Several factors have been influencing in developing resistance either by vertical or horizontal gene transfer among microbial species through different ecosystems. Microorganisms are altering genetic makeup to tackle the existing antibiotics very rapidly. Therefore, there is an urgent need to overcome this resistance and to develop new forms of antibiotics that are cost-effective, biocompatible, showing fewer side effects and a single-step fabricated approach that helps for large scale production. Biogenic mediated metallic nanoparticles became a

2013

225

# Emerging Trends in Nanotechnology

## Innovations, Health and Risks

S. Janardana Reddy

AGROBIOS

# Nanotechnology: Biomedical Applications and Human Health

S. JANARDANA REDDY\*<sup>1</sup>, M. SRINIVASULU REDDY<sup>2</sup>,  
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<sup>4</sup>Department of Botany, SV Arts College, Tirupati.

## INTRODUCTION

In recent years Nanotechnology and Nanoengineering stand to produce significant scientific and technological achievements in diverse fields including medicine and physiology related to humans. It is defined generously as "The Science, Technology and Engineering are intricated in the design, synthesis, characterization, and Application of materials and the gadgets whose smallest functional organization in at least one dimension is on the nanometer scale, ranging from a few to several hundreds of nanometres". A nanometer means one billionth of a meter or triple size of a magnitude smaller than a micron (*e.g.*, a DNA molecule is 2.5nm long whereas a sodium atom is 0.2 nm) (Siddhartha and Dash, 2009).

In the 21st century, the field of nanotechnology is in rapid flux and development, and the definition of its boundaries became ambiguous. Aspects of multiple disciplines, ranging from physical science to computer science and biotechnology, plausible contribute to the endeavour. This broadness of field allows many interested alliances to contribute to nanotechnology, but the same ambiguity can productively render the field nebulous. The rigorous definition of nanotechnology remains controversial, so consideration of the present amplitude of the field might



# Nanotechnology: Biomedical Applications and Human Health

S. JANARDANA REDDY\*<sup>1</sup>, M. SRINIVASULU REDDY<sup>2</sup>,  
A. T. VENKATA RAMANA REDDY<sup>3</sup>, N. NAGA RAJU<sup>4</sup>

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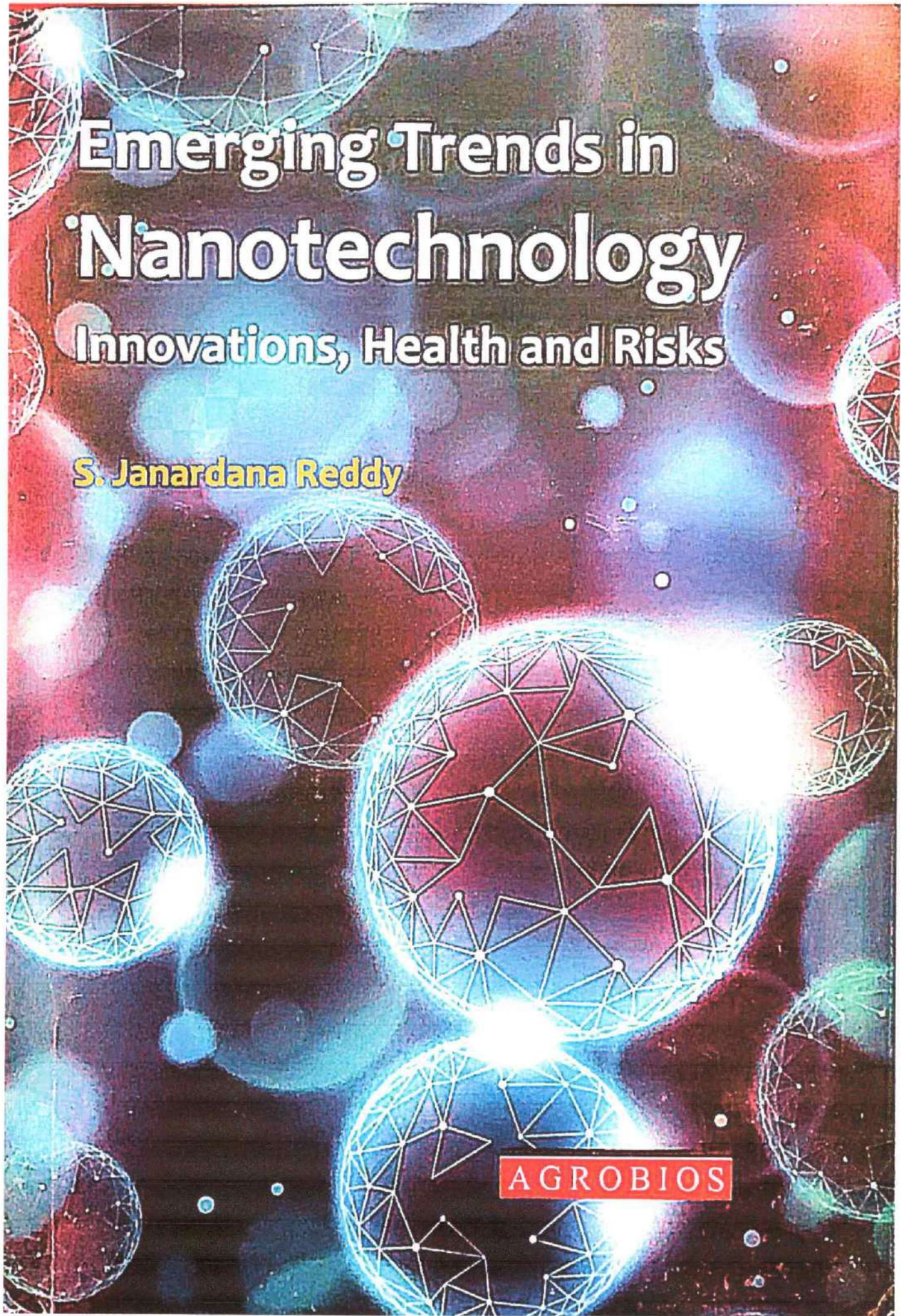
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# Emerging Trends in Nanotechnology

## Innovations, Health and Risks

S. Janardana Reddy

AGROBIOS



# Therapeutic Role of Nanotechnology in Neurological Diseases

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## ABSTRACT

Last few decades have witnessed nanotechnology helping to improve and even revolutionize different sectors such as medicine, electronics, energy, manufacturing, food and agriculture among many others. The basic concept behind this technology is that, materials or particles at nanoscale exhibit distinct physicochemical characters that can be altered and functionalized for better results. Though nanomaterials are portrayed as a recent development, we have been exposed to naturally produced nano entities since the inception of the earth and indeed have co-evolved with humans. With the advent of the industrial revolution, incidental nanomaterials have been produced as byproducts unintentionally, whose impact on health and environment are not duly evaluated. After the realization of their potential applications, large amounts of engineered nanomaterials or particles of different types and makes are delivered to cater to their demand in varied sectors. Nanotechnology enabled approaches have gained the attention of researchers to find solutions,

203

221



P. Naga Lakshmi  
S. P. Venkata Ramana

## Diversity and life cycle strategies of Papilionid butterflies in A.P.

Diversity and life cycle strategies of endemic and endangered Pailionid butterflies in the plains and forest regions of Southern Andhra Pradesh - India

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This book is an outcome of research work carried out for three years in the Department of Zoology, School of life sciences, Yogi Vemana University, Kadapa, Andhra Pradesh, India. This book encompasses 5 chapters. Chapter I deal with the taxonomy of Papilionids and its behavior, adaptations, significance and its conservation. Chapter II covers with literature and diversity of Papilionids. Chapter III & IV deals with methodology, life cycle parameters, food energetics and detailed discussion. This book can be good foundation for future endeavors to build upon these results for development of Papilionid butterfly conservation. Butterflies are the flying jewels used as a potential requirement for analytical studies by the ecologists across the globe concerning recent scenarios of Eco-biological and Biodiversity studies.

Dr. P. Naga Lakshmi has completed doctoral degree in Yogi Vemana University, Kadapa, Andhra Pradesh, India. She has published several research papers in the field of Eco-biology of Papilionidae and other butterflies under the guidance of Dr. S. P. Venkata Ramana, Asst. Prof., YVU and she participated in several seminars.



9 7 8 6 2 0 3 4 0 9 7 6 5

202

220

## Chapter 16

# Nanotechnology-A New Frontier in Medical Microbiology



Silpa Somavarapu, Bellamkonda Ramesh, Ch. Venkatrayulu, and M. Subhosh Chandra

**Abstract** Nanotechnology relates to microbiology at a number of levels as the microbial entities are nano-machines. In the second half of this decade, nanotechnology expanding its applications in the field of medical microbiology. Nanotechnology is clinically appropriate and retains the potential to be valuable in the diagnosis of general and microbial infections. The rapid detection of pathogenic microbes at the point of care is extremely critical. The application of nanoparticles permits for the detection of infectious pathogens in small sample volumes directly in a sensitive, specific, and rapid format at lower costs than current in-use technologies. A bio-conjugated nanoparticle-based bioassay for in situ pathogen quantification can detect a single microbe. The waveguide technology is an emergent area in the medical microbiology for the fast and successful diagnosis of infectious diseases. Nanotechnology is demonstrated for the detection of Avian influenza virus H5N1, Respiratory Syncytial Virus (RSV), HIV, and Severe acute respiratory syndrome (SARS) Coronavirus in clinical samples with a great degree of sensitivity. Nanoparticle-based bio-barcode amplification (BCA) assay is being applied for early detection of HIV-1 capsid antigen. The gold nanoparticle interferometer sensor has been validated for detection of Herpes simplex virus (HSV) and silver nanorod array substrates can detect spectral differences between the viral strains. A nanoparticle label technology with highly fluorescent chelated nanoparticle label has been developed for Adenovirus and Human papillomavirus (HPV). The nano-gold labelled amplification is a novel technique for the detection of Hepatitis B virus, Hepatitis C virus, and Hepatitis E virus in patient's samples. Norovirus is a leading cause of gastroenteritis and nanospray mass spectrometry is evaluated for norovirus detection. With the manifestation and intensification of microbes resistant to antibiotics, silver nanoparticle antiseptics have been evaluated for the antimicrobial

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375

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## Chapter 3

# Influence of Significant Parameters on Cellulase Production by Solid-State Fermentation



M. Subhosh Chandra, P. Suresh Yadav, Pallaval Veera Bramhachari, and Narasimha Golla

**Abstract** Cellulases become an area of unique attention in bioremediation methods owing to their capability to breakdown cellulose. Development of cost-effective, high titer of attractive enzymes by fungi is a challenge. The overproduction of dynamic enzymes which cut various  $\beta$ -1,4-glycosidic bonds still wreck a challenge and is the key blockage for the cellulosic biomass transformation. Microbes are an eye-catching topic for production of cellulases because of their enormous prospective for production of cellulase, enzyme intricacy, and severe habitation variability. Microbial cellulolytic enzymes are ideal because of their immense advantages in number of industries. In fact, trend for cellulolytic enzymes is undeniably expanding for their use in bioremediation, pharmaceuticals, pulp and paper, waste management, food processing, and so on. Future research is ensuing into enhanced scientific information in addition to the achievement of summit of the rising demands of cellulase and associated enzymes for production of eco-friendly textiles, detergents, bio-pulping, and bio-alcohols. Furthermore, it is opening novel paths for exploitation of a variety of agricultural residues and pollutants as a basis of renewable energy in lieu of throwing away to cause environmental degradation. In years to come, newest knowledge of outstanding cellulolytic enzymes and acceptance of various biotechnological approaches will undoubtedly bring immense vision in the field of green chemistry. Hence, the present book chapter focused on fungal cellulases in bioremediation and factors affecting cellulases production by solid-state fermentation (SSF).

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200

# Winemaking

## Basics and Applied Aspects

V.K. Joshi • Ramesh C. Ray (eds)



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<b>12. Malo-lactic Bacteria in Winemaking</b>	<b>300</b>
<i>Albert Bordon, Isabel Araque, Mar Margalef-Català and Cristina Reguant</i>	
<b>13. Biochemistry of Winemaking</b>	<b>331</b>
<i>V.K. Joshi, H.P. Vasantha Rupasinghe, Ashwani Kumar, and Pooja Kumari</i>	
<b>14. Genetic Engineering of Microorganisms in Winemaking</b>	<b>381</b>
<i>Gargi Dey</i>	
<b>15. Oenological Enzymes</b>	<b>405</b>
<i>Harald Claus</i>	
<b>16. Additives, Adjuvants, Packages, Closures and Labels in Enology</b>	<b>420</b>
<i>L. Veeranjanya Reddy and V.K. Joshi</i>	
<b>17. Biogenic Amines in Wine</b>	<b>452</b>
<i>Spiros Paramithiotis and Ramesh C. Ray</i>	
<b>18. Immobilised Yeast in Winemaking</b>	<b>468</b>
<i>Steva Lević, Verica Đorđević, Ana Kalušević, Radovan Đorđević, Branko Bugarski and Viktor Nedović</i>	
<b>19. Winemaking: Control, Bioreactor and Modelling of Process</b>	<b>495</b>
<i>Steve C.Z. Desobgo and Emmanuel J. Nso</i>	
<b>20. Wine Maturation and Aging</b>	<b>520</b>
<i>Hatice Kalkan Yıldırım</i>	
<b>Section 3: Applied Aspects of Winemaking (A) Production of Wine and Brandy</b>	
<b>21. Technology of Winemaking</b>	<b>547</b>
<i>V.K. Joshi, Vikas Kumar and Jaspreet Kaur</i>	
<b>22. Cider: The Production Technology</b>	<b>581</b>
<i>V.K. Joshi, Somesh Sharma and Vikas Kumar</i>	
<b>23. Brandy Production: Fundamentals and Recent Developments</b>	<b>608</b>
<i>Francisco López</i>	
<b>24. Biovalorisation of Winery Wastes</b>	<b>635</b>
<i>Konstantinos V. Kotsanopoulos, Ramesh C. Ray and Sudhanshu S. Behera</i>	
<b>Section 3: Applied Aspects of Winemaking (B) Evaluation of Wine</b>	
<b>25. Analytical Techniques in Oenology</b>	<b>657</b>
<i>Disney Ribeiro Dias, Leonardo de Figueiredo Vilela and Rosane Freitas Schwan</i>	
<b>26. Advances in Analytical Techniques: Determination of Toxic Components, Microelements, Compounds of Aroma and Therapeutic Significance</b>	<b>675</b>
<i>Simona Guerrini, Silvia Mangani, Giovanna Fia and Lisa Granchi</i>	
<b>27. Astringency and Colour of Wine: Role, Significance, Mechanism and Methods of Evaluation</b>	<b>703</b>
<i>M. Teresa Escribano-Bailón, Alba M. Ramos-Pineda and Ignacio García-Estévez</i>	
<b>Index</b>	<b>721</b>
<b>Color Section</b>	<b>727</b>

# 16 Additives, Adjuvants, Packages, Closures and Labels in Oenology

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## 1. Introduction

Wine production is the process by which yeast converts grape sugar into alcohol and carbon dioxide. But because of wine – the word sounds simple enough – today's winemakers are facing a number of problems beginning from the vineyard to the bottle. Since the past few decades, scientific knowledge of the wine process has become so extensive as to provide many choices to wine makers (Gardner, 2008). To process the products, including wine, several methods are employed to preserve through use of different additives, adjuvants and preservatives. The main reason wine adjuvants and additives are popular is because of their harmlessness (when used correctly) and their ability to improve the sensory qualities (taste, smell, etc.), stability, colour, clarity and age-worthiness of the wine. Common additives are added generally before fermentation. A good rule of thumb to follow is that if the wine needs corrective additives of some kind, then, something has to be wrong with the quality of the grapes, the region (climate), or the process of winemaking. Of course, finding out what additives a winemaker has used is a bit challenging because there is a shroud of secrecy and consumer fear around the topic (Marchal and Jeandet, 2009).

In the wine world, there are many different wine additives, some of which have been used for hundreds of years with no ill effects. The intention of these additives is not to adulterate the wine, but to stabilise it. When it is stable, it is possible for the wine to have a longer shelf life. Many of these are not really additives; instead they glom (with molecular attraction) on to unwanted particles and are removed from the finished wine. Many adjuvants/additives that help to restart a stuck fermentation have been proposed, for example, addition of ammonium does not raise any counter indications with little improvement of the second fermentation. The addition of ammonium sulphate should be limited to 5 g/hl due to the limited use of nitrogen by yeast. The winemaker must react accordingly and, if need be, use additives such as nitrogen, vitamins and yeast hulls whose effectiveness has been clearly established. In addition to the above elemental operations, notably aeration and temperature control must also be standardised. Fresh wine is turbid with very high particle content, consisting of yeast lees and other grape debris. Clarity and stability of wine are the essential qualities required to convince the consumers. Particles in suspension (that form a haze or disperse through the liquid) not only spoil the presentation, but also affect the flavour. Clarity is achieved by gradual settling, followed by racking to eliminate the solids. Wine treatments are determined by its intended purposes. For instance, filtration clarifies but does not stabilise; fining does both and the treatment with gum arabic stabilises wine, but does not clarify it. Efficient packaging is necessary for both kinds of fresh or processed food and it is an essential link between the food producer and the consumer. The basic function of packaging is to identify the product and safe transportation of the product through the distribution system to the consumer. Including the above preserving the farm or processor freshness or preventing physical damage, cost effectiveness is also very important in the designing and packaging process. Packages must be easy and safe to handle, simple to open and use, and pose no problems in their disposal (Paine and Paine, 1992). Traditionally, wines have been packaged in glass bottles, but new developments include packaging in plastic bottles, laminate lined bag-in-box systems, laminated paperboard cartons and metal cans (Markowski, 1989; Buchner et al., 1988; Anelli, 1988). The basic purpose of a closure is mainly to seal the container and

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# 16 Additives, Adjuvants, Packages, Closures and Labels in Oenology

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**Chapter 3** 1  
**Value Added Products from Agriculture,** 2  
**Paper and Food Waste: A Source** 3  
**of Bioenergy Production** 4

**M. Subhosh Chandra, M. Srinivasulu, P. Suresh Yadav,** 5  
**Bellamkonda Ramesh, Narasimha Golla, and Thummala Chandrasekhar** 6

**Abstract** Solid waste generated from food mainly contains various organic com- 8 AU1  
pounds such as carbohydrates, lipids, and proteins. These biodegradable wastes 9  
mainly released from food, Agricultural, household, and hospitality segments. The 10  
waste material produced from food is frequently burned or discarded into open areas, 11  
which may also become a source of many severe health and environmental prob- 12  
lems. The management of waste material generated from food is done by transform 13  
into various value-added products, like phytochemicals, food supplements, bioactive 14  
materials, dietary fibers, safe to eat and important oils, bio fertilizers, biofuels, and 15  
single-cell proteins (SCP). Every year, enormous amounts of solid waste (sludge) 16  
from the wastewater treatment of paper manufactures have been created. They might 17  
be dumped into the landfill if they have heavy metals lower than the standard of the 18  
Department of Industrial Work and the Ministry of Industry. Now a day, the area of 19  
landfills is quite limited whereas solid waste has been accumulated. In the case of 20  
waste from agriculture biomass, a few of them are mixed with soil or applied as 21  
ingredients of the fertilizer. On the other hand, the value of the wastes is fairly low. 22  
Hence, the manufacture of value-added products, such as furniture cardboard, and 23  
packaging and the agricultural product from solid wastes could be useful. This 24

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## CHAPTER 4

**Assessment of heavy metal contamination in soils and groundwater at an industrial area, Bangalore, Karnataka, India**

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**Abstract:** Much concern over soil pollution of heavy metals because of accelerated industrialization and urbanization has been addressed in recent years. The present research was conducted to examine the dispensation of potentially dangerous elements (PHEs) (Cr, Cu, Ni, Pb, and Zn) concentrations in soils of the Bommasandra Industrial Area on the Varanasi – Kanyakumari National Highway (Longitude 77° 40' to 77° 45' and 12° 45' to 12° 50' N Latitude), south-east of Bangalore City to determine the level of chemical contamination. Geologically, peninsular gneisses, close-pet granites, lateritic hills, and some basic dykes with undulating terrain are beset by the study area. The semi-arid type is the climate of the study area. Two hundred soil samples were collected from the Bommasandra industrial areas and tested for heavy metals using a Philips Magi X PRO-PW 2440 X-ray fluorescence spectrometer. According to the data, the soil in the region is heavily polluted with heavy metals such as Chromium (Cr) ranges from 11.8 to 335 mg/kg (average of 136 mg/kg), Cu from 10 to 221 mg/kg (average of 77 mg/kg), Pb from 0 to 397 mg/kg (average of 21 mg/kg), Ni from 0 to 308 mg/kg (average of 98 mg/kg), and Zn from 11 to 435 mg/kg (average of 78 mg/kg). The distribution and association of heavy metals in soils was explored, as well as potential remedial steps. These findings are significant for the development of appropriate management strategies through the study of various remediation methods to reduce point and non-point pollution sources.

**Key words:** Heavy metals; Urbanization; Industrialization; Remediation; Bommasandra.



### CHAPTER 3

## Landuse and Landcover Analysis using Remote Sensing and GIS to study the Change Impact on Water Resources in Parts of Porumamilla, YSR District, Andhra Pradesh, India

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**Abstract:** The use of multi-temporal satellite imaging helps to understand landscape dynamism through digital shift detection techniques. Integrated approach based on advanced applications of remote sensing and geographical information systems (GIS) lends itself as an efficient and effective result-oriented method for studying the development and management of water resources. Land use change pattern reveals the rate of change of groundwater recharge. It is necessary to identify the land use change in the past and present accessible land use, and its allocated and potential changes are major rudiments for planning and management. The current study shows the space and time dynamics of land utilization/decoration in the area of Porumamilla, Kadapa District, Andhra Pradesh. Landsat satellite imagery was obtained by earth explorer site for two separate periods of time, including Landsat Thematic Mapper (TM), quantifying changes in the field of research 2008 to 2018 over the 10 years. Methodology for supervised classification was used in ERDAS 2014 for maximum probability technologies. The photographs in the field of research were grouped into five classes: forestry, agriculture and wastelands, built-up, waterbodies. The findings show that over the past decade, land and build-up was increased by 3.48% (12.82 km<sup>2</sup>) and by 4.03% (14.86 km<sup>2</sup>), while forestry, woodland and waterways were reduced by 6.81% (25.1 km<sup>2</sup>) and 3.72% (13.7 km<sup>2</sup>) and 1.9% (7 km<sup>2</sup>), respectively.

**Key Words:** Land use / Land cover, Remote Sensing, GIS, Erdas Imagine, Waterbodies.

**Chapter 9** 1

**Insights on the Biotechnological** 2

**Applications of Marine Fungal** 3

**Exopolysaccharides** 4

**A. M. V. N. Prathyusha, G. Triveni, G. Mohana Sheela, B. Anand Kumar,** 5

**G. Bhargava Ram, T. Chandrasekhar, and Pallaval Veera Bramhachari** 6

**Abstract** Microbial exopolysaccharides are the subject of research in many scientific areas, focusing on elucidating structure-function relationships, identifying novel biosynthetic pathways, and unraveling applications based on their distinct properties. Marine fungi signify a relatively untapped bio-resource for novel exopolysaccharides molecules; however, marine fungi are evidenced with great industrial significance during past decades. High molecular diversity, complexity and growth in unique and extreme habitats make the marine fungi produce unusual exopolysaccharides. However, due to their unique rheological properties, marine fungal exopolysaccharides have found several applications in the environment, food, cosmetic and pharmaceutical industries. The current review emphasizes untapped marine fungi focusing on exploring the fungal exopolysaccharides with novel structures and unique functional properties.

**Keywords** Marine Fungi · Exopolysaccharides · Industrial applications · Unique functional properties

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Agriculture & Allied Sciences

*Innovations in Agricultural and Biological Engineering*

## Bioremediation and Phytoremediation Technologies in Sustainable Soil Management, Volume 3 Inventive Techniques, Research Methods, and Case Studies

Editors: Junaid Ahmad Malik, PhD  
Megh R. Goyal, PhD

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Phytoremediation has evolved into an important tool to improve the bioremediation process since it is an innovative green technology that uses a wide variety of plants to remediate radioactive metals, organics, chemicals, and radioactive elements from soil, sediment, surface water, and groundwater environmental pollutants. Together, bioremediation and phytoremediation technologies provide an effective approach to contaminant abatement.

This new book, volume 3 of the four-volume set **Bioremediation and Phytoremediation Technologies in Sustainable Soil Management** identifies and draws a fresh image of existing developments in theoretical and functional implementation systems from recent scientific research studies that take into account different facets of bioremediation. It also discusses the latest technology and prospects of new soil bioremediation technology and analyses their domains, along with their associated challenges and consequences.

**Volume 1: Fundamental Aspects and Contaminated Sites** begins with an overview of phytoremediation and phytotechnologies and the role of environmental factors. It goes on to introduce soil assessment techniques and offers methods of remediation designed to combat soil and agricultural degradation. Attention is given to specific types of sites and soil pollution, such as soils contaminated by heavy metals; microbial and phytoremediation-based removal of polycyclic aromatic hydrocarbons (PAHs) from coal, crude oil, and gasoline; microbial bioremediation and amelioration of pesticide-contaminated soils; phytoremediation techniques for biomedical waste contaminated sites; as well as bioremediation processes for human waste sites. Biopesticides are also explained in the book as an alternative to conventional pesticides as well as the possibilities for the improvement of modern bio-pesticides.

**Volume 2: Microbial Approaches and Recent Trends** focuses on new and emerging techniques and approaches to address soil pollution. These include the use of rhizobacteria, archaea, cyanobacteria, and microalgae as biofertilizers and for soil bioremediation efforts. New technologies for assessment of soil bioremediation are explored also. The chapters provide in-depth coverage of the mechanisms, advantages, and disadvantages of the technologies used and highlights the use of different microbial enzymes that are used in the process of bioremediation and phytoremediation to clean up different pollutants without causing damage to the natural environment.

**Volume 4: Degradation of Pesticides and Polychlorinated Biphenyls** addresses pesticide degradation, PCBs degradation, and genetic interventions. It begins by describing environment pesticide degradation, mechanisms and sustainability, microbes and microbial enzymes, plant microbe interactions,

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FLYING  
POETICS

(ANTHOLOGY OF POEMS)

Edited By

WAKIL KUMAR YADAV

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ii

164. Our Beloved .....	373
Dr. Vijetha M Jillella .....	373
165. Union.....	376
Siddhartha Pratapa .....	376
166. Reality of “real” women .....	378
Gursimran Sekhon" .....	378
167. -live your elusive life.....	379
Gursimran Sekhon" .....	379
168. -pictures.....	381
Gursimran Sekhon" .....	381
169, just another dream .....	382
Gursimran Sekhon" .....	382
170. i will speak.....	383
Gursimran Sekhon" .....	383
171. CORNER WITH LOST.....	385
DEPORAH ZOE S STAJI .....	385
172. SHE.....	388
DEPORAH ZOE S STAJI .....	388
173. SHORT – TERM FRIENDSHIP.....	390
DEPORAH ZOE S STAJI .....	390
174. THOSE EVENINGS.....	393

## 164. Our Beloved

Dr. Vijetha M Jillella

Lavender Pink White Yellow  
Orange Cosmos  
Bunches of Roses hanging...  
Flowers fruits all around the  
mansion delights

Sign posts mentioning  
H.No... and Prof. ...

On a White, Blue classic car  
Inscribed Prof. ... our pride

Press of a switch  
Effectual angel at the abode  
A never fading smile on her brow  
In a tidy elegant attire our beloved  
Mx ...with 'Maggie' like sons

192



## Peanut (*Arachis hypogaea* L.) Transgenic Plants for Abiotic Stress Tolerance

Chandra Obul Reddy Puli, Chandra Sekhar Akila,  
Varakumar Pandit, Sravani Konduru, Suresh Raju Kandi,  
and Sudhakar Chinta

### Abstract

Groundnut (*Arachis hypogaea* L.) is one of the important legume cash crops of tropical and semi-arid regions, where it provides a major source of edible oil and vegetable proteins. Abiotic and biotic stresses in groundnut negatively influence on survival, biomass production, and total crop yield. Breeding groundnut genotypes for abiotic stress tolerance will likely sustain groundnut production. Traditional approaches such as breeding for abiotic stress tolerance have been slow, due to the rare alleles implicated in abiotic stress tolerance in the existing groundnut germplasm. Hence, engineering for abiotic stress resistance is an important target for increasing groundnut productivity. The chapter focuses on the development of transgenic groundnut plants for abiotic stress tolerance and the constraints associated with it. This review also describes the recent progress in using genetic engineering approaches for the improvement of abiotic stress tolerance in groundnut.

### Keywords

Peanut · Abiotic stress · Transgenic plants · In planta transformation · DREB1A · NHX

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CHAPTER

11

Alginate-based hydrogels

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11.1 Introduction

11.1.1 Overview/objective

Alginate is a natural anionic polymer extracted from the brown seaweed, which comprises β-D-mannuronic acid (M) and α-L-glucuronic acid (G) units (Fig. 11.1); these are arranged in a linear manner either by homogeneous (GG/MM) or heterogeneous (GM/MG) units through 1 → 4 glycosidic linkages [1] (Fig. 11.2). The genus of brown seaweed includes the *Saccharina japonica*, *Laminaria hyperborean*, *Macrocystis pyrifera*, *Ascophyllum nodosum*, etc. [2]. In addition, alginate can be produced in a laboratory scale by bacteria *Azotobacter vinelandii* and *Pseudomonas* spp. [3]. It was first discovered by Stanford ECC in 1881 [4]; however, the industrial commercialization of this polymer has taken place after 100 years, especially in Europe, the United States, and Japan. The hydroxyl (-OH) and carboxyl (-COOH) functional groups of alginate are responsible for its potential physicochemical properties. Hence it has been widely used in various applications such as drug delivery, tissue engineering (TE), agriculture, food industry, cosmetics, water purification, wound dressings, and electrical devices (Fig. 11.3). In addition, these properties are significantly influenced by alginate production parameters such as molecular weight, acetylation degree, the arrangement of uronate units, and M/G ratio [5].



190 199

## CHAPTER 6

### Polymer Electrolyte Membranes for Fuel Cell and Drug Delivery Applications

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**Abstract:** Polymer membranes are emerging substrates for industrial applications like power solutions, toxic metal ion removal and drug delivery technologies. Among all types of membranes polymer electrolyte membranes (PEMs) are current interest, due to their physico-chemical interaction with the guest molecules. PEMs are capable to transport or permeate, adsorb and delivery of molecules, ions and other required reagents. This chapter provides basic concepts as well as the progress with regard to PEMs based science and technology of fuel cells and drug delivery.

**Key words:** Polymer Electrolyte Membranes, Fuel Cell, Drug Delivery

## Therapeutic Applications of *Nigella Sativa* and its Metal Nanoparticles

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**Abstract:** *Nigella sativa* is an annual flowering plant belongs to the family Ranunculaceae commonly known as Black seed, Black cumin or Kalonji. It is considered as one of the most miraculous healing medicines existed as a remedy for all diseases specified in varied traditional system of medicine and food. Phytochemically, it is enriched in fixed oil, terpenoids, essential oil, alkaloids etc and few key chemical constituents such as thymol, carvone, thymoquinone, nigellicimine, nigellicine, dithymoquinone and thymohydroquinone. Therapeutic properties of this plant are due to the presence of thymoquinone which is one of major active component and has different beneficial properties. Ample of phytochemical, pharmacological and clinical researches have been executed on this plant which may include antidiabetic, anticancer, immunomodulator, analgesic, antimicrobial, anti-inflammatory, bronchodilator, hepato-protective, renal protective, gastro-protective, and antioxidant properties etc. This plant also been studied for nanoparticle synthesis via green route with varied biological applications. Considering above all these aspects, this plant catches the attention of research analyst to tactic the utility, proficiency and potency of *Nigella sativa* in diverse medicinal sectors.

**Key words:** *Nigella sativa*, green synthesis, thymoquinone, Kalonji seed.

## Recent Innovations in Natural Gums Based Adsorbents for the Removal of Toxic Metal Ion from Wastewater

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**Abstract:** Natural gums which are hydrophilic carbohydrate polymers of high molecular weights, generally composed of monosaccharide units joined by glucosidic bonds have been attracting many researchers. These are used in confectionaries, dairy products, beverages, as emulsifier in food products, petroleum and for oil-well-acidizing purpose in the industry. They also have pharmaceutical applications as demulcents, adhesives in pill manufacture and as emulsifying agents. These natural polysaccharides do hold advantages over the synthetic polymers, generally because they are nontoxic, less expensive, and freely available. They are also used for the removal of heavy metals from water. They have great potential in removal of heavy metals due to their bio sorption properties. They are readily available, cheap and eco-friendly. The present chapter focuses on the application of gums particularly in the removal of heavy metals from water.

**Key words:** Natural Gums, Adsorption, Toxic Metal Ions, Green Technologies

Nitrogen and sulfur heterocycles are recognized as "privileged medicinal scaffolds" because these compounds are found in a wide variety of bioactive natural products and pharmaceuticals. Among them, azoles (1,2 and 1,3-azoles) have been considered as an 'important structural motif' in a huge number of natural products and also in medicinally valuable compounds. Because of their broad based utility, efforts to develop green and sustainable synthetic methodologies for the synthesis of 1,2 and 1,3-azoles are on the ever-increasing trend in synthetic organic chemistry. In the present study, attempts have been made to develop new synthetic routes for the synthesis of benzo-fused 1,2-azoles (indazoles) and 1,3-azoles (benzimidazoles) and nitrogen and sulfur containing 1,3- azoles like thiazoles (i.e. 2-aminothiazoles and hydrazinyl-thiazoles). Further, biological activities (antioxidant, antimicrobial and anti-cancer) of the synthesized hydrazinyl-thiazole compounds have been investigated.



Dr. N.C. Gangi Reddy obtained PhD degree from Sri Venkateswara University, Tirupati, INDIA. Working as an Associate Professor in the Department of Chemistry, Yogi Vemana University, Kadapa. His research interests are i) Design and synthesis of D-A type small organic fluorescent materials and ii) Development of green synthetic methodologies.



Trivikram Reddy, Chinna Gangi Reddy

Gundala Trivikram Reddy  
Nallagonda Chinna Gangi Reddy

# Synthesis and Biological Evaluation of N and S Based Heterocycles

New Synthetic Approaches to Nitrogen and Sulfur Based Heterocycles and Biological Assessment for Selected Analogs

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The carbon-carbon and carbon-heteroatom bond formation reactions are considered as important transformations in synthetic organic chemistry. They are effectively used in the synthesis of natural products and pharmaceutically important compounds. In the present study, attempts have been made to develop green and sustainable synthetic methodologies for the construction of carbon-carbon and carbon-heteroatom bonds.

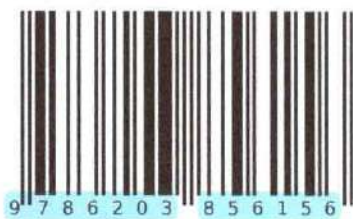
C-C, C-N, C-O, C-S & C-X bonds construction



Pinjari Mohammad Khaja Mohinuddin  
Nallagonda Chinna Gangi Reddy



Dr. NC Gangi Reddy obtained a PhD degree from Sri Venkateswara University, Tirupati, India. Working as an Associate Professor at the Department of Chemistry, Yogi Loader University, Kadapa. His research interests are i) Design and synthesis of D-A type small fluorescent materials and ii) Development of green and sustainable synthetic methodologies.



## Carbon-Carbon and Carbon-Heteroatom Bond Formation Reactions

Development of Green and Sustainable Methodologies for Carbon-Carbon and Carbon-Heteroatom Bond Formations

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## SUSTAINABLE AGRICULTURE IN INDIA

*Editors*

Dr. T. Sudarsana Reddy  
Mr. K. Saketh Reddy



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## Dry-Land Agriculture and Watershed Development in Andhra Pradesh

T. Sudarsana Reddy

Assistant Professor, Department of Economics, Yogi Vemana University, Kadapa.

### Abstract

*This paper attempts to assess the impact of the WSD programmes covering sample watersheds from two different schemes (IWDP and DPAP) in drought-prone regions of AP with the following objectives: to examine the functioning of the watershed development programme, level of people's involvement in planning and implementation of the programme, and the extent of impact of the programme on the resource conservation, improvement in production and increase in incomes. The analysis is based on the data collected from 21 watersheds spread over 4 Mandals of Kurnool district of Andhra Pradesh.*

*The analysis indicates that the WSDP has created a positive impact in the watershed villages in terms of soil and moisture conservation and a rise in the water table level by 20 to 23 per cent leading to increase in irrigated area and thereby an increase in crop production. The overall impact of WS is positive on irrigation, environment and livelihoods as it stabilizes production in spite of droughts. It has also been successful in promoting horticulture and animal husbandry activities. These achievements have resulted in reducing seasonal migration by about 75 per cent in IWDP areas and about 47 per cent in DPAP areas. It has also been successful in bringing about fairly good awareness among people regarding the need for WSD activities for promotion of agriculture in fragile ecological zones. Nevertheless, the programme appears to be weak with regard to community organization for maintaining the assets created as well as continuing the programme through UGs (User Groups) and people's involvement.*

### I. Introduction

India was perhaps the first developing country to formally recognize the danger of soil erosion and land degradation vis-a-vis food security and prosperity of the nation. Bio-mass production system can be practiced on land only if it is available in required quantum and desired quality. All other inputs including irrigation and fertilizers do not help in increasing production if the land is not responsive and continues to be degraded. Soil and Water Conservation Research Centers (SWCRCs) have been established to identify the problems of land resources. These Research Centers demonstrated that an integrated and inter-dependent land management system helps to prevent degradation of resources and enhance production. To achieve the above an

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OP 56

**Targeting Colon Cancer Stem Cells by Dietary Bioactive Compounds in  
the Prevention of Colon Carcinogenesis**

**Ramakrishna Vadde**

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Colorectal cancer (CRC) is one of the most commonly diagnosed cancers in both men and women, posing a serious demographic and economic burden worldwide. Globally colon cancer strikes more than one million people annually and is responsible for more than half a million cancer deaths. Recent studies shows that the majority of malignancies, including colon cancer are driven by cancer stem cells (CSCs) that are resistant to current chemotherapeutic drugs leading to cancer relapse. Wnt signaling plays a critical role in colon stem cell (SC) renewal and carcinogenesis. Diet contributes to 20-42% of all human cancers and 50-90% of colon cancer. Recent evidence shows that Western diet has a causative link to colon cancer; however, mechanisms of action are not fully elucidated. Western diet-induced obesity elevates IGF-1 and insulin levels, which could lead to elevated proliferation and suppressed apoptosis of CSCs through Wnt pathway. Although conventional chemotherapy targets the signaling pathways and can significantly reduce tumor size, but fails to eliminate CSCs and has serious side effects. Dietary bioactive compounds such as curcumin, lycopene, etc have promising chemopreventive effects, without serious side effects on cancers due to their direct and indirect actions on CSC self-renewal pathways such as the Wnt pathway. Understanding the role of CSCs in diet-induced colon cancer will aid in development of evidence-based dietary chemopreventive strategies and/or therapeutic agents targeting CSCs.



## International E-Conference on New Horizons in "Biochemistry, Microbiology and Food Technology - 2020"



OP 52a

### Role of Thymic Tolerance in Autoimmune Diseases

Madhava C. Reddy<sup>1</sup>, Ellen R. Richie<sup>2</sup> and Yinling Hu<sup>3</sup> **Dakshayani Lomada<sup>2, 4\*</sup>**

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The thymus, a major lymphoid organ, provides a place for T cell development through positive and negative selection. Following positive selection, T cells enter negative selection, in which T cells interact with medullary thymic epithelial cells (mTECs) and dendritic cells within the medullary area to delete self-reactive T cells or to generate suppressive regulatory T cells (Tregs), facilitating the establishment of central tolerance. Defects in mTEC development impair central tolerance and cause autoimmune disease. Thus, autoimmune diseases are caused by a failure of central tolerance, genetic and environmental abnormalities resulted in the imbalance of immunoregulatory and inflammatory processes. Autoimmune diseases exhibit systemic inflammation, which causes severe organ damage or death. Mobile inflammatory cells transduce signals among different organs, initiating the development of disease. STAT3, NF- $\kappa$ B and inhibitor of NF- $\kappa$ B kinases (IKK) are broadly expressed in both inflammatory cells and epithelial cells and are required for the development of lymphocytes, lymphoid organs, and some epithelial tissues. Defects in these signaling molecules are associated with autoimmune disease. However, how STAT3, NF- $\kappa$ B/IKK-mediated signaling orchestrates the connection between different cells to initiate the pathogenesis of their associated diseases remains to be revealed. We identified the association of reduced thymic medullary regions, systemic inflammation, and severe skin damage in *Ikk $\alpha$*  knockout mice. Our data reveals the crucial pathways, which connect defective central tolerance associated-self-reactive T cells to severe autoimmune disease development. Nanotherapy using TNT strongly supports an immunosuppressive role to control the development of EAE and CIA with potential applications in the treatment of autoimmune diseases. Preclinical models of autoimmune disease showed a role for the thymus in autoimmune diseases. Unfortunately, our knowledge of thymus biology and of methods for modeling human thymopoiesis in vitro remains limited. As a consequence, the practicality of these potential therapeutic measures in preclinical disease models and in the clinical context remains largely untested. Future research should therefore focus on efforts to bridge this restrictive knowledge gap between preclinical and clinical studies.



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OP 45

**Proximate and antioxidant activity of traditional minor millets cultivated and consumed in Rayalaseema region of South India**

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Millets have been recognised as nutri-cereals and climate resilient crops and are traditionally consumed as staple food by millions of people living in the food insecure arid and semi-arid parts of the developing countries of Africa and Asia. Minor millets continue to receive very little attention due to the lack of scientific input towards their nutrient profiling and antioxidant potential especially millet cultivars of Rayalaseema region, about which much less information is available. Proximates including total dietary fibre, polyphenols, and antioxidant potential of various minor millets (finger, foxtail, proso, little, barnyard and kodo millets) and their cultivars, traditionally grown and consumed in the Rayalaseema region of south India were studied. Results indicate that protein content of investigated minor millets ranged between 78-134 g kg<sup>-1</sup> (sorghum 89-110 g kg<sup>-1</sup>). The fat content values were between 21 - 41 g kg<sup>-1</sup> (sorghum 23-28 g kg<sup>-1</sup>). Starch content of minor millets ranged between 453-656 g kg<sup>-1</sup> (sorghum 710-738 g kg<sup>-1</sup>). The amylose content of millets varied from 89 to 175 g kg<sup>-1</sup> (sorghum 108-187 g kg<sup>-1</sup>). Further moisture content of minor millets ranged from 83 to 87 g kg<sup>-1</sup> (sorghum 81-99 g kg<sup>-1</sup>) and ash content ranged between 28 and 39 g kg<sup>-1</sup> (sorghum 9.2-17.5 g kg<sup>-1</sup>). The total dietary fibre content ranged from 121 to 331 g kg<sup>-1</sup> (sorghum 25-90 g kg<sup>-1</sup>) and total phenol content values between 0.66 and 2.00 g kg<sup>-1</sup> (sorghum 0.16-0.36 g kg<sup>-1</sup>). The radical scavenging capacity of minor millets ranged from 3.7 % to 21.5%. Ascorbic acid equivalent antioxidant activity ranged from 180 mg kg<sup>-1</sup> to 600 mg kg<sup>-1</sup>. Minor millets are nutritionally rich in protein, fat, ash, fibre and Total Phenol Content with appreciable antioxidant capacity; while they have lower moisture, starch and amylose content as compared to the major millet, sorghum. Minor millets can combat micronutrient malnutrition as higher ash content of minor millets is indicative of its rich mineral content. Finger and kodo millets were found to be nutritionally superior over other minor millets studied. The results suggest that minor millets have a potential to provide food security.



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"Biochemistry, Microbiology and Food Technology - 2020"**



GPx when compared to the normal control. When treated with extract and silymarin, there was a significant ( $P > 0.05$ ) increase in the levels of these parameters compared to paracetamol-induced control. From the results, it can be concluded that the methanol root extract of *Mitragynainermis* possess hepatoprotective activity against paracetamol-induced rat liver damage. This hepatoprotective potential could be due to the presence of some phytochemicals identified.

**Keywords:** *Mitragynainermis*, Hepatoprotective, Antioxidant Activity, some phytochemicals

OP 40

**MICROBIAL MINING, A COST-EFFECTIVE PROSPECTING TECHNIQUE FOR  
SAFE ENVIRONMENT**

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Traditional mineral extractions involve many expensive steps like digging, material conveyance, roasting and smelting etc., and require sufficient concentrations of corresponding minerals. Furthermore, they pose lot of environmental queries and creating hardship by harming environment. Microbial mining (Biomining) is an alternative and new technique for potential extraction of minerals like copper, iron, uranium, gold, silver, aluminium, nickel, cobalt, titanium, molybdenum, zirconium, zinc etc (Mohd. Haris Siddiqui et al, 2009). Microorganisms like Bacteria and Fungi are employed in mining for winning the mineral and metals concentrations. The species involved in biomining include *Acidithiobacillus ferrooxidans* (*Thiobacillus ferrooxidans*), *Leptospirillum ferrooxidans*, *Leptospirillum ferriphilum* for extraction of iron bearing minerals, *Acidithiobacillus thiooxidans* (*Thiobacillus thiooxidans*), *Acidithiobacillus caldus* (*Thiobacillus caldus*) for extraction of sulphur bearing minerals like copper, lead zinc, gold, uranium etc., (Mohd. Haris Siddiqui et al., 2009; Clark, D.A., et al., 1999; Leduc, et al, 1994). Two fungi species *Aspergillus niger* and *Penicillium somplicissimum* were able mobilize Copper, Tin, Aluminium, Nickel, Lead, Zinc by more than 95% (Brauer, H., 1991; Mohd. Haris Siddiqui et. al., 2009). Though it is a new technique which is moderately



OP 38

**Non *albicans* Candida: Emerging heterogeneous pathogens isolated from diabetic patients**

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Yeast like fungi usually dimorphic in nature considered as nonpathogenic or less virulent now recognized them as a primary cause of morbidity and mortality in immunocompromised and severely ill patients. *Candida* spp. is the most common opportunistic fungal pathogens; Now a days the incidence of *C. albicans* is declining throughout the world. It has been reported that, gradually decreasing the *C. albicans* infections have been replaced by *non albicans candida* infections. The most important predisposing factors are an ever-expanding population with mucosal or cutaneous barrier disruption, as well as the quantitative or qualitative dysfunction of neutrophils or of cell-mediated immunity and metabolic disorders.

We enrolled a total of 125 subjects (both diabetic and non diabetic among 67 males, 58 females) with an average age ranging from 20 to 80years including smoking (24), nonsmoking (101), among the total subjects symptomatic 28%, The incidence of candidiasis caused by non-albicans *Candida* (NAC) species (67.6%) was higher than *Candida albicans*(32.3%). Among the virulence factors secreted by the pathogens we found *C. parapsilosis* and *C. ontarionsis* species secreted the maximum phospholipase enzyme. In case of protease production *C. parapsilosis* and *C. tropicalis*-2 species secreted the maximum protease enzyme. The haemolysin activity and their fluctuations were expressed in the form of Hz values. Except *C. ontarionsi* all most all test organisms were showed the very strong hemolytic activity with high Hz values. *C. ontarionsi* is medium producer. The highest and lowest coagulase activity was observed with *C. ontarionsi* and *C. parapsilosis* respectively. We also tested the antifungal activity with plant extracts found encouraging results.



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"Biochemistry, Microbiology and Food Technology - 2020"**



OP 37

**Dot-Blot Assay: A Rapid and reliable method for the Detection of  
Lymphatic Filariasis**

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WHO launched the global programme to eliminate lymphatic filariasis (GPELF) in 2000 to initiate activities to eliminate lymphatic filariasis (LF) as a public health problem, a goal subsequently targeted for 2020. The ongoing DEC based mass drug administration as part of global filarial elimination programme requires a sensitive, reliable detection assay to monitor the treated population, to ensure the transmission of infection and further surveillance.

An immunodominant seroreactive clone, WbL<sub>1</sub>, was identified through immuno-screening of a *Wuchereria bancrofti* L3 complementary DNA library. Recombinant WbL<sub>1</sub> (rWbL<sub>1</sub>) was analyzed with sera from *W. bancrofti* patients. Diagnostic evaluation was carried out by developing a simple and effective dot blot assay method to detect the filarial-specific IgG4 antibodies in various categories of filarial sera samples against recombinant WbL<sub>1</sub> (rWbL<sub>1</sub>) protein.

Performance parameters of the test displayed significant sensitivity and specificity values up to 93.3% and 96.7%, respectively. Our results showed filarial antibodies against rWbL<sub>1</sub> to be highly reactive with microfilaremic and clinical filarial sera samples compared with the endemic and non-endemic control sera samples. The anti-WbL<sub>1</sub> IgG4 detection test can be considered as a field test for initial screening and epidemiological monitoring of filarial infections in filariasis-endemic areas.





OP 36

**Green Synthesis of Silver Nanoparticles Using Fresh Water Microalgae  
*Spirogyra sp.* and Their Anti-Bacterial Activity**

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Green synthesis of nanoparticles was gaining importance for their utility in various fields including pharmacology, medicine, agriculture etc., Less or scanty information is available in the area of freshwater algal research and their potential usage in nanoparticle synthesis. In the present study, freshwater algal biomass of *Spirogyra sp.* collected from the Penna river basin from Siddavatam was culture established in net house conditions of YVU, YSR Kadapa Dist., AP., India was used for the Silver nanoparticles biosynthesis. The green synthesis of silver ions (Ag<sup>+</sup>) shows a yellow color solution to red color extract and these silver nanoparticles synthesis having an absorption peak at 430nm under the UV-visible spectrum. Further these nanoparticles were characterized by using a UV-visible spectrophotometer, scanning electron microscopy (SEM), EDX, Fourier Transform Infra-Red (FTIR), Dynamic light scattering (DLS). The average size of the nanoparticle size was estimated to be around 28-58 nm and the antimicrobial activity of SNPs was tested Gram-positive bacteria like *Bacillus subtilis*, *Staphylococcus aureus*, *Clostridium sporogenus*. Gram-negative bacteria as *Echeresia coli*, *Pseudomonas aeruginosa*, *Klebsiella pneumonia* by measuring the inhibition zone and result confirmed that Silver nanoparticles can be an antimicrobial agent against some pathogenic microbes.

**Keywords:** Fresh Water Algae, Green synthesis, Silver nanoparticles, Antibacterial activity



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"Biochemistry, Microbiology and Food Technology - 2020"**



OP 35

**Exposure of zestoretic to pregnant rats alters developmental landmarks in the young ones**

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Zestoretic, is a combination of lisinopril and hydrochlorothiazide used as anti-hypertension drug in humans including during pregnancy. No reports are available to know the role of zestoretic in the developmental landmarks of prenatal exposed young ones and behavior of pregnant women. The present investigation aimed to study the effect of zestoretic on behavior and developmental landmarks of Wistar rats. Zestoretic (lisinopril varied concentrations + hydrochlorothiazide 12.5mg) at a dose of 25, 50 and 100 mg/Kg body weight were administered orally to three different groups of inseminated rat on gestation days 7, 9, 11 and 13, whereas controls were administered with distilled water. Controls and experimental groups could deliver pups and zestoretic. No clinical signs of toxicity were observed in the behavior of experimental animals during experimentation when compared to controls except few dams from 50 and 100 mg/Kg body weight received which shown aggressive behavior. The developmental land marks, such as pinna attachment, ear opening, fur development, eye opening, upper and lower incisor eruption, crown rump length, vaginal opening and testes descend were measured periodically on their post-natal days from all the groups. The number of live pups in zestoretic 50, 100 mg/Kg body weight administered females are significantly less when compared to controls and other experimental groups. Significant decrease in the survival index of pups in 50, 100 mg/Kg body weight zestoretic administered female group was observed and no significant decrease in control and 25 mg/Kg body weight. There is two- or three-days delay in early onset of puberty in females (vaginal opening) and testes descent in males of experimental groups were also observed. Body weights, crown rump length, anogenital distance and eye opening of control and exposed animals were measured on postnatal day (PND) 1, 7, 14 and 21 and found change. No significant change was observed in pinna detachment, ear opening, fur development, upper and lower incisor eruption in experimental groups when compared to controls. It was concluded that zestoretic has interferes in developmental landmarks in rat.

**Key words:** Zestoretic, Prenatal, Developmental landmarks, Puberty, Testes descent.



OP 34a

**Tragacanth Gum Based Interpenetrating Polymeric Hydrogel Network For  
*In Vitro* Anticancer Drug Release Applications**

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The paper describes the development of dual responsive IPN hydrogel from tragacanth gum with temperature & pH sensitive monomers by a simple free radical polymerization using N,N'-methylene-bis-acrylamide as a crosslinker and potassium per sulphate as an initiator. These hydrogels were successfully characterized by the FTIR, DSC and XRD to know the chemical structure, thermal and crystalline nature. The temperature and pH-sensitive swelling behavior of IPN hydrogels were investigated in different pH solutions and temperature. The *in vitro* drug release profiles will be performed in pH 1.2 & 7.4 and temperatures 25 and 37 °C. The release of drug *n* values occurred through fickian diffusion mechanism and best fitted the Korsmeyer-Peppas model. The release mechanism will be analyzed by evaluating the swelling release data using different empirical equations.

**Keywords:** Tragacanth gum, Dual responsive behavior, Anticancer drug, Drug delivery.



OP 33

**ISOLATION AND IDENTIFICATION OF FUNGAL PATHOGEN INFECTION ON BANANA TREES**

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Banana is the third important fruit crop after mango and citrus, occupying 8% of the fruit growing area in the State of Andhra Pradesh. Although it is cultivated in almost all the districts, it is extending in East Godavari, West Godavari, Cuddapah, Guntur, Krishna, Visakhapatnam, Vijayanagaram and Kurnool districts. Fusarium wilt disease is a fungal disease caused by a soil pathogen *Fusarium oxysporum*. These fungal spores present in the soil or in the infected planting material find entry through the roots and into the rhizome of the healthy banana plant. In the present study these fungi were isolated from small pieces (sterilized with 5% sodium hypochlorite) of leaf, corm, pseudostem and fruit from diseased samples and cultured on a potato dextrose agar [PDA] medium. Growing colonies of fungi were purified by single spore and hyphal tip method. Based on the morphological characters and pathogenicity tests, the isolated fungal species were identified as *Fusarium oxysporum*.

**KEYWORDS:** Fusarium wilt, *Fusarium oxysporum*, *Musa acuminata*.



**International E-Conference on New Horizons in  
“Biochemistry, Microbiology and Food Technology - 2020”**



OP 32

**An update on virology and molecular pathogenesis of coronavirus disease-2019**

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Coronavirus disease 2019 (COVID-19) is an emerging, rapidly spreading pandemic, initially reported in China. Its causative agent was identified as severe acute respiratory syndrome coronavirus 2 (SARS-CoV2). As per the WHO, globally, more than 32.7 million confirmed cases and one million deaths were recorded as on September 28, 2020 indicating major public health threat. SARS-CoV2 is a positive-sense single-stranded- RNA virus with ~ 30 kb size genome belongs to the *Nidovirales*. Molecular analysis revealed that SARS-CoV2 is a variant of SARS-CoV, Middle East respiratory syndrome (MERS)-CoV with some sequence similarity. The confirmed cases and death toll are high in SARS-CoV2 compared to SARS-CoV and the estimated  $R_0$  is  $>1$ . The data on pathological findings on SARS-CoV2 is scarce and present treatment management is based on symptoms which are similar to SARS-CoV. In this paper, we will discuss the virology, transmission and highlighted the recent pathological findings. The reported SARS-CoV2 pathological findings were similar to that of SARS-CoV. Though these findings help to notify the clinical course of disease, it warrants further *in vivo* and *ex vivo* studies with larger samples obtained from the COVID-19 patients.



## International E-Conference on New Horizons in "Biochemistry, Microbiology and Food Technology - 2020"



OP 32a

### Indian cultural stratagems: A treasure of medicine for current health and disease prevention

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How people of ancient India had overcome the epidemics and pandemics that arose from time to time, is a million dollar question. We can find a solution by studying the scientific aspects of cultural customs of the ancient societies. Indian - Hindu cultural customs are treasures of scientific strategies for healthy survival of human beings on the globe. Understanding the scientific facets of Indian - Hindu cultural customs help us to find the required solution to prevent and/or cure the diseases arising from time to time and their spread from endemic to pandemic like, COVID-19 (corona virus disease-2019), influenza, meningitis, yellow fever, Ebola, cholera, plague etc. There are many aspects of Indian culture holding scientific background and we can draw inferences from them to prevent and/or cure the communicable diseases. We have reviewed some of the Indian cultural strategies with the modern scientific approaches. We hope this review can change the outlook of people to avoid the spreading of deadly diseases like COVID-19, SARS (Severe Acute Respiratory Syndrome), MERS (Middle East Respiratory Syndrome), etc., in all aspects of human life with the treasure of Indian Hindu culture.

#### **Key words**

Endemic & pandemic disease; Indian-Hindu customs; COVID-19; SARS; MERS; disease prevention.



**International E-Conference on New Horizons in  
"Biochemistry, Microbiology and Food Technology - 2020"**



OP 20

**Prenatal baicalein exposure induced oxidative stress and its recovery by testosterone administration during postnatal period in male Wistar mice**

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Excessive baicalein (BC; a flavonoid) intake during pregnancy period has been demonstrated to provoke oxidative stress an associated factor of male infertility in offspring. The role of testosterone depot in the recovery of damaged antioxidative system in prenatal BC exposed male mice was tested. For this female Wistar mice were administrated intraperitoneally with 30, 60 and 90 mg/kg BW of BC on gestation days 11, 13, 15 and 17. F1 BC exposed males were sacrificed on post-natal day (PND) 60 to assess the oxidative stress. The results showed a significant increase ( $P < 0.0001$ ) in testicular, liver and kidney malondialdehyde (MDA) levels in prenatal BC exposed males. In contrast to increased lipid peroxidation observed decrease in ( $P < 0.001$ ) levels of antioxidant enzymes such as superoxide dismutase (SOD) and catalase (CAT) in prenatal BC exposed adult males in a dose dependent manner than controls. Administration of testosterone (4.16 mg/kg body weight) to BC exposed adult mice were normalized the levels of MDA, SOD and catalase in testis, liver and kidney and are comparable to controls. The administration of testosterone refused the antioxidant defense system and is proved in the present study.



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OP 17

### Induction of plant growth promotion and drought stress tolerance by non-host endophytic bacteria in rice (*Oryza sativa* L.) and peanuts (*Arachis hypogaea* L.)

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Plant growth promoting endophytic bacteria, being a vital agent have been described for abiotic stress mitigation and growth promotion in plants for sustainable agriculture practices. The present study aims the isolation and *in vitro* characterization of plant growth promoting properties of endophytic bacteria from the roots of *Prosopis juliflora* (Sw) dc and the effect of these endophytes in non-host plants *i.e* rice (*Oryza sativa* L.) and peanut (*Arachis hypogaea* L.) under droughty stress conditions. Several endophytic bacterial strains were isolated the root interior of *P.juliflora*, among the isolated strains, *Bacillus amiloliquefaciens* M69 (PJ4), *Stenotrophomonas maltophilia* SaY2-b (PJ6), *Pseudomonas sp.* SG-08s (PJ12) were showed the best performance in extra cellular enzyme activities (cellulase, pectinase, amylase and lipase) and plant growth promoting activities (nitrogen fixation , ammonia, IAA, ACC deaminase, siderophore production and phosphate solubilization), along with salt and heavy metal tolerance. PCA-Biplot ordination data confirmed that PJ4, PJ6 and PJ12 strains have displayed distinguishing similar characteristics. The activity of cellulase and pectinase observed in these isolates indicates the importance of these characteristics for survival and colonization into the plant. Further these bacterial strains were tagged with *gusA* (PJ4::*gusA*11, PJ6::*gusA*11 and PJ12::*gusA*11) genes were used to enumerate and visualize tissue colonization and observed chronologically first on root surfaces, then in root internal tissues, and in the internal tissues of leaves. The effect of inoculation of three bacterial endophytes was observed on growth and water status in rice and peanut plants under drought stress conditions. Plants were exposed to drought stress by withholding ten days irrigation at vegetative growth stage (45-55 days in rice and 55-65 days in peanut). The bacterial inoculations minimized the drought stress-imposed effects, significantly increasing shoot biomass, root biomass, chlorophyll content, proline and total soluble sugars. Our data suggest that rice and peanut plants can be colonized with three isolates isolated from *Prosopis juliflora* plants. The endophytes enhance the growth of rice and peanut plants and can be protected under drought stress.





**International E-Conference on New Horizons in  
“Biochemistry, Microbiology and Food Technology - 2020”**



OP 16

**Phytochemical analysis and *In vitro* biological assessment of *Gyrocarpus americanus* and *Murinda pubescence*: potential effectiveness in treating Alzheimer’s disease and Diabetes Mellitus simultaneously**

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As Alzheimer’s disease (AD) and Diabetes Mellitus (DM) are most likely to appear together in aged people. Many studies have been recorded over the past few years on the search for agents to treat AD and DM simultaneously. In this study, extracts of *Gyrocarpus americanus* and *Murinda pubescence* were assessed for their capacities to inhibit target enzymes Acetylcholinesterase (AChE), Butyrylcholinesterase (BuChE) and  $\alpha$ - &  $\beta$ -glucosidases. The methanolic extracts and derived chloroform fractions were found to be most prominent in inhibition with IC<sub>50</sub> values range of 63.14±20.8 – 10.29±0.8 µg/mL. The most active chloroform fractions exerted remarkable DPPH and ABTS radical scavenging activity. In MTT cell viability assay, these fractions were nontoxic and neuroprotective against induced SK N SH cell injury. The phytochemical analysis revealed that these activities could be attributed, at least in part, to the presence of large quantities of phenolics and flavonoids in active chloroform fractions. In conclusion, the aforementioned results provided valuable evidence for the potential of chloroform fractions of methanolic extract of *G. americanus* and *M. pubescence* as prospective material for further development of multifunctional agents to control both DM and AD simultaneously.

**Key words:** *Gyrocarpus americanus*, *Murinda pubescence*, phytochemical analysis, antioxidant activity, anticholinesterase activity, antidiabetic activity



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combination of Phenotyping and advanced Genotyping technologies will be utilized for the identification of lines with superior allelic combinations to combat malnutrition with high yielding varieties under various stresses. The potential utility of these genetic (landraces), genomic (NGS whole genome based SNP's) in parental lines and segregating mapping population of foxtail millet will be presented.

OP 12

### **NADP-malic enzyme and pyruvate, phosphate dikinase activity in onion (*Allium cepa* L.) seedlings under drought stress**

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Drought is one of the major stress which affects agricultural crop productivity around the world. Against drought plants have developed variety of defense mechanisms involving physiological, chemical and molecular responses. The aim of the present work is to investigate the response of NADP-malic enzyme (NADP-ME, EC 1.1.1.40) and pyruvate, phosphate dikinase (PPDK, EC 2.7.9.1) to drought stress in onion seedlings. The experimental design was randomized entirely, with different concentrations of polyethylene glycol - 6000 i.e., 0, 25 g/l, 50 g/l, 75 g/l and 100 g/l treatments in six different cultivars of *Allium cepa* L. namely Agrifound rose (AF), Bellary (BL), Prema-178 (PR), Nasik red (NR), Arkakirthiman (AK) and Arkalalima (AL) and the NADP-ME and PPDK was studied at different time intervals of 0 h, 4 h, 8 h, 24 h and 48 h. Result interprets that the activities of NADP-ME and PPDK increased with increasing concentration of PEG-6000. 3.9 and 3.2-fold increase in NADP-ME and PPDK activity was observed in AL onion after 48 h of drought treatment when compared to control. The cultivar AL exhibited best response followed by AK and BL. Therefore NADP-ME and PPDK, the C<sub>4</sub> enzymes participate in the drought stress response of onion, a C<sub>3</sub> Plant. Further research may help in the understanding of the drought stress mechanism of adaptation of the onion germplasm to drought.

**Key words:** NADP-ME, PPDK, Drought stress, Onion cultivars, PEG-6000



**International E-Conference on New Horizons in  
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OP 11

**Landraces as a Source for Superior Alleles: A Step Towards Mapping  
Population Development, Linkage Map Construction and QTL  
Identification for Yield Related Traits under Drought Stress in Foxtail  
Millet (*Setaria italica* L.)**

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Foxtail millet is a small grained C4 Paicoid cereal that belongs to the family Poaceae, known for tolerance to various abiotic, biotic stresses and seed with high nutritional value and a genome size of about ~515 MB. Since, the beginning of Green Revolution, it started to diminish from their cultivation areas irrespective of their superior nutritional value and productivity under variety of stresses compared to other major cereals. Keeping in view of the importance of these landraces, we have generated 20 numbers of genetically fixed lines of local landraces of foxtail millet and evaluated by precise phenotyping (drought stress and seed micronutrient content) along with released cultivars. Further phenotypic studies confirm a wide range of seed micronutrients in landraces and out performed under induced drought stress conditions in vegetative and reproductive stress compared to release cultivars. Based on the integrative data, different combinations of biparental crosses were made, true F<sub>1</sub>'s were selected and advanced to F<sub>4</sub> generation. Further, the molecular genetic diversity was assessed using high throughput illumina HiSeq2500 Next Generation Sequencing (NGS) technology based Whole Genome Re-sequencing of the selected parental lines was initiated. Our study is one of the pioneers where a





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OP 10

**Biodiversity - Butterflies benefit from Agricultural buffers in the field areas of Southern Andhra Pradesh – India**

**S.P. Venkata Ramana**

Department of Zoology, Yogi Vemana University, Kadapa

Butterflies flutter from flower to flower, providing researchers with a glimpse of an ecosystems health. Butterflies help gauge environmental conditions, serve as a food source for birds and wild life and like honeybees, pollinate plants. This last function is vital, as one-third of the food produced for human consumption is dependent on native pollinators. Upland habit buffers are strips of native grasses and wild flowers planted along agricultural field margins. These strips are widely planted, often to protect waterways from erosion or agrichemicals. Farmers need to receive financial assistance to create buffers through a number of conservation programmes by the government. Our findings in the field areas of southern Andhra Pradesh suggest that buffers benefit bird and butterfly communities. In our findings in the agricultural lands of southern Andhra Pradesh during the period from July to November of 2018 & 19 we found 42 different species of butterflies in the conservation buffers surrounding the agricultural fields. Butterflies are attracted to the plants more than to agricultural crops. Still we are investigating the importance of butterflies to the Ecosystem and the linkages between butterflies and other wildlife and plant species. Conservation buffers provide a solution for increasing native pollinators and improving habit while providing financial benefits to the farmers.

Key words: Butterflies, Buffers, Ecosystem, Pollinators, conservation



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OP 9

**Influence of culture conditions on CMC<sub>ase</sub> production by *Aspergillus protuberus* in Submerged fermentation**

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The purpose of this study was to determine the influence of culture media on Carboxymethyl cellulase (CMCase) production and protein content by *Aspergillus protuberus* in submerged fermentation. In order to select the best suitable medium, the production of CMCase was estimated by growing the *A. protuberus* in four different culture media for 7 days at 30°C temperature at 150 rpm. Among four culture media, Czapek dox broth, Potato dextrose, Mandel and Reese broth and Malt extract broth media were screened for the production of CMCase by *A. protuberus*. Among the different broth medium, Czapek dox broth and Malt extract broth was found to be the best for maximum production of CMCase (3.7 FPU/ml) and protein content (12.75 mg/ml) at 2<sup>nd</sup> and 8<sup>th</sup> day of incubation, respectively. For further study, Czapek dox broth medium was selected for CMCase production.

**Keywords :** *Aspergillus protuberus*, Carboxymethyl cellulase, Protein content, Submerged fermentation.



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OP 8

**Bioenergy from Algae: Fuel to our Future**

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Regular depletion of non-renewable fossil fuels urges the scientific community to augment the production of renewable fuels. Though number of advanced techniques emerged to generate more renewable fuels, still it needs lot of efforts towards implementation. Biofuels are one of the good examples of renewable energy sources which are non-polluting and eco-friendly. In addition, people are preferred to generate energy from any waste including biological waste. In this process, our laboratory chose photosynthetic green algal species as source to produce biofuels such as biohydrogen and bioethanol by altering physico-chemical and biological methods. In extent, we used certain nanoparticles and achieved the improvement of biohydrogen and bioethanol production. Present work may be useful to enhance the production of biofuels from algae for commercial purpose.



OP 5

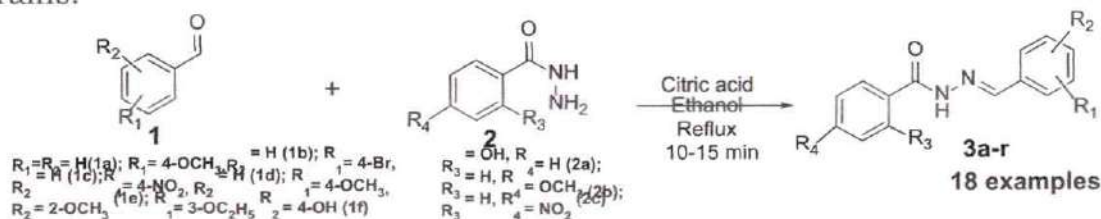
### Synthesis and biological evaluation of aldo-*N*-acylhydrazones

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*N*-Acyhydrazones (NAHs) are considered as "medicinally privileged scaffold" because of their wide range of biological activities such as anti-inflammatory, analgesic, anti-tubercular, antiviral agents etc.<sup>1</sup> In addition to their biological significance, *N*-acyhydrazones are an important building blocks in synthetic organic chemistry. For instance, *N*-acyhydrazones are an intermediates in aza-Diels-Alder cyclisation,<sup>2</sup> thiazolidinone and thiazolidine synthesis.<sup>3</sup> Iproniazide and isocarboxazide are the two important drugs which are prepared by the reduction of the corresponding *N*-acyhydrazones.<sup>4</sup> Because of their potential utility in various fields, enormous research has been conducted and many efficient methods have been reported for the synthesis of *N*-acyhydrazones.<sup>5</sup> Despite these developments, there are still some drawbacks such as harsh reaction conditions, lengthy reaction times, use of toxic catalysts etc. Therefore, the development of practical, green and sustainable synthetic routes for the synthesis of *N*-acyhydrazones remains an active area of research. However, to date there are no reports on citric acid catalyzed synthesis of *N*-acyhydrazones. Herein, we demonstrated a rapid, more efficient, green and sustainable synthetic route for the synthesis of *N*-acyhydrazones (**3**) from readily available aromatic aldehydes (**1**) and hydrazides (**2**) catalyzed by biodegradable citric acid in ethanol under reflux conditions (Scheme 1). Wide substrate scope, easy to perform, cleaner reaction profile, short reaction times and good yields at low catalyst loading and products free from chromatographic purification are the notable advantages of the present method. Antibacterial activities of the synthesized compounds are systematically evaluated. From this study, it is observed that the synthesized compounds exhibited moderate to good antibacterial activity against Gram-positive and Gram-negative bacterial strains.



**Scheme 1.** Citric acid catalyzed synthesis of *N*-acyhydrazones.



Dr. P.R. Reddy obtained M.Sc., Ph.D. in Biotechnology from Sri Venkateswara University, Tirupati, AP, India. VATAAT Post-Doctoral Research Fellow at Department of Life Sciences and Biotechnological Engineering, BGU, Israel (2006-07). UGC-Raman Fellow at PSU, USA (2016-17). Currently working as Associate Professor in Biochemistry, Yogi Vemana University, Kadapa-516 005, AP, India. Research experience – 19 Years; Teaching experience – 14 Years. Core research areas are crustacean molecular endocrinology, mammalian reproductive toxicology and bioactive compounds against colorectal cancer. Published more than 50 research papers in International reputed journals, 3 books and 10 book chapters. Awarded worth of more than Rs. 75 lakhs research projects from UGC, DST and DBT, New Delhi, India.



Dr. L.V. Reddy obtained Ph.D. in Biochemistry from Sri Venkateswara University, Tirupati, AP, India. BK21 Post-Doctoral Research Fellow at Department of Bio-resource Technology, Chonnam National University, Korea (2006-07). International Research Professor/Fellow at Yeungnam University, Korea (2019-20). Currently working as Associate Professor in Microbiology, Yogi Vemana University, Kadapa-516 005, AP, India. Research experience – 19 Years; Teaching experience – 14 Years. Core research areas are biofuels, wine production and nanobiotechnology. Published more than 50 research papers in International reputed journals, 1 book and 15 book chapters. Awarded worth of more than Rs. 75 lakhs research projects from CSIR, DST and DBT, New Delhi, India.

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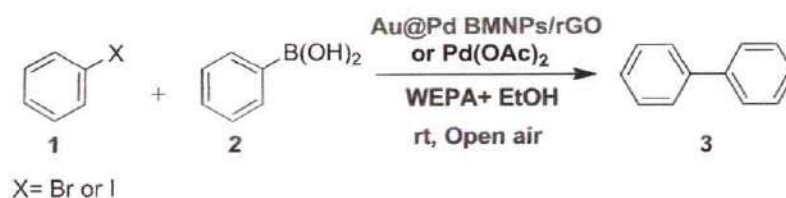
## Reduced graphene supported Au<sub>core</sub>-Pd<sub>shell</sub> bimetallic nanoparticles (Au@Pd BMNPs/rGO) catalyzed Suzuki reaction in WEPA

S. Siva Prasad, A. Rama Moorthy, P. S. Palani Babu, P. Mounika, **K. Venkateswarlu\***

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**Abstract:** Biaryls (**3**) are the constituent units of several natural, pharmaceutical, energy based, paints and special chemical compounds. Despite the difficulty in their construction, we have recently observed the synthesis of biaryls from aryl bromides/aryl iodides (**1**) and arylboronic acids (**2**) (Suzuki reaction) using reduced graphene supported Au<sub>core</sub>-Pd<sub>shell</sub> bimetallic nanoparticles (Au@Pd BMNPs/rGO) as heterogeneous catalyst in water extract of pomegranate ash (WEPA) (**Scheme**). This method uses the agro-waste derived media with an absence of toxic ligands like phosphenes. The wide substrate scope, reusability of the catalyst (up to three cycles), utilization of waste, exploration of aqueous media, high to nearly quantitative yields of biaryls, easy separation of products and feasibility to conduct the reaction at ambient aerobic conditions are noteworthy developments of this study.

**Keywords:** Reduced Graphene, Au<sub>core</sub>-Pd<sub>shell</sub>, Suzuki Reaction, Water Extract of Pomegranate Ash



**Scheme:** Au@Pd BMNPs/rGO catalyzed Suzuki reaction in WEPA.

## Isolated Natural Products of *Cassia Occidentalis*: as Inhibitors of $\alpha$ -Glucosidase

**Z. Raveendra Babu**<sup>1</sup>, **R. Sampath**<sup>2</sup>, **A. Dinakara Rao**<sup>2</sup>, **S. Jeelan Basha**<sup>1</sup>, **K. Yalamanda Rao**<sup>1</sup>, **A. G. Damu**<sup>1,\*</sup>

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**Abstract:** Diabetes Mellitus is a group of diseases marked by high levels of blood glucose resulting from defects in insulin production, insulin action, or both. The disease is often associated with obesity, hypertension, and increased risk of cardiovascular disease. Globally, diabetes is the fourth leading cause of death by disease. Indians are more prone for diabetes than almost any other population in the world, Calling India the diabetes capital of the world. One intriguing approach to control diabetes could be its prevention and treatment by phytochemicals that improve postprandial glycemic control and reduce postprandial hyperglycemia. Many plants Species are reported to have  $\alpha$ -glucosidase inhibitory activities. Synthetic and naturally derived compounds are also known to reduce postprandial hyperglycemia by inhibiting  $\alpha$  -glucosidase.

Nowadays, despite remarkable advances in synthetic pharmaceutical chemistry, natural products continue to play a highly significant role in drug discovery. Within the most successful drugs on the market, small molecules of natural origin have occupied a prominent position. In this context, the following compounds are isolated from the *Cassia occidentalis* using simple chromatographic techniques to test as inhibitors of  $\alpha$  -glucosidase as potential treatment of Diabetes Mellitus.

**Keywords:** Diabetes Mellitus,  $\alpha$ -glucosidase, *Cassia occidentalis*

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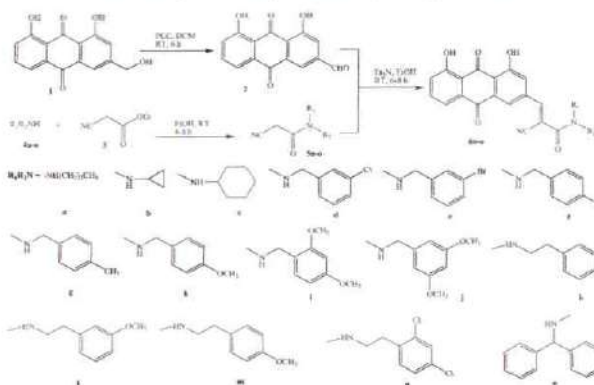
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## Design and Synthesis of Cyanoacetamide Derivatives of *Aloe-Emodin*, A Biologically Privileged Natural Product

**C. Sivanagababu, B. Amaravathi, A. Sravani, B. Aparna, B. Rajesh, A. Varalakshmma, B. Nethra, B. Naganandini, B. Sreelekha, C. Sulochana, B. Vinod, A. Venkatesu, B. Padmapriya, C. Raju, K. Yelamanda Rao, A.G. Damu\***

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**Abstract:** Natural products continue to provide useful drugs or templates for the development of medicinally important compounds<sup>1</sup>. *Aloe-emodin* is the major anthraquinone in plants and possesses antibacterial, antiviral, hepatoprotective, anticancer, laxative, and anti-inflammatory activities<sup>2</sup>. *Aloe-emodin* is also reported to have weak AChE inhibition activity<sup>3</sup>. Hence, in search of new rationally designed inhibitors for the treatment of AD, we designed and synthesized a series of *aloe-emodin* and cyanoacetamide hybrids to assess as multifunctional agents against AD. A series of fifteen *aloe-emodin* derivatives were synthesized starting from *aloe-emodin* and ethylcyanoacetate. The alcoholic hydroxyl of *aloe-emodin* (**1**) was first oxidised into formyl group (**2**) in anhydrous DCM under the catalytic action of PCC at RT. As required, N-substituted cyanoacetamide derivatives (**5a-o**) were prepared by treating ethylcyanoacetate (**3**) in EtOH with alkyl/benzyl amines (**4a-o**) at RT. Finally, the substituted cyanoacetamides (**5a-o**) were reacted with **2** via Knoevenagel type condensation in refluxing EtOH using Et<sub>3</sub>N as base to obtain target compounds (**6a-o**) in fair yields.



Biological evaluation of target compounds to prove as MTDLs against AD is under progress.

**Keywords:** Cyanoacetamide, Aloe-Emodin, Natural Product, AChE inhibition activity

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## A New Bilayer Thin Film Counter Electrode for Efficient Dye Sensitized Solar Cells

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**Abstract:** In this paper, we propose an efficient and new bilayer thin film CE, PEDOT:PSS/SWCNH and investigated their electro-catalytic ability for dye sensitized solar cells (DSSCs). The bilayer thin film CE was prepared using simple spin coating process. The electro-catalytic ability of spin coated bilayer CE's, PEDOT:PSS/SWCNH, was analyzed using atomic force microscopy (AFM), cyclic-voltammetry (C-V), electrochemical impedance spectrophotometer (EIS) and Tafel tools. The results revealed faster catalytic reduction of  $I_3^-$  to  $I^-$  with improved electrolyte-catalytic performance and low charge transfer resistance at interface of electrolyte/CE for PEDOT:PSS/SWCNH CE. The DSSC's fabricated using bilayer thin film PEDOT:PSS/SWCNH CE's showed an improved efficiency of 5.1 % and is comparable with standard Pt CE (5.53 %).

**Keywords:** Solar Cells, PEDOT, DSSC, Cyclic-voltammetry

## Removal of Rhodamine 6 G Dye Using Litchi Peel

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**Abstract:** Litchi chinensis peel was used as an adsorbent to remove Rhodamine 6 G. The characteristics of the adsorbent were characterized by Scanning Electron Microscope, Energy Dispersive X-ray Spectroscopy, XRD and Fourier Transform Infrared techniques. Adsorption of Rhodamine 6 G was studied using various parameters such as initial concentration, contact time, dosage of biosorbents, temperature, initial pH value and synthetic waste water treatment were investigated to find out the optimum adsorption conditions. Equilibrium adsorption data followed Langmuir isotherm and second order rate kinetics. The Langmuir adsorption capacity ( $Q_0$ ) was found to be 6.666 mg/g of the adsorbent. From the Dubinin-Radushkevich isotherm model the mean free energy ( $E_a$ ) was found to be 50 kJ/mol and  $Q_m$  26.703 mg/g. Thermodynamic parameters such as  $\Delta G^\circ$ ,  $\Delta H^\circ$ , and  $\Delta S^\circ$  were calculated and found that the Rhodamine 6 G adsorption on to *Litchi chinensis* peel was exothermic and spontaneous in nature.

**Keywords:** Rhodamine, *Litchi chinensis*, waste water, Adsorption Isotherm and Kinetics

## Antibacterial Effect of Indian Gooseberry (*Phyllanthusemblica L.*) Extract Against ESBL Producing Multi-Drug Resistant Bacteria

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**Abstract:** Indian gooseberry (Amla) is the most celebrating fruit in Ayurveda, Indian traditional medicine, for the prevention of numerous diseases. However, no reports on the prevention of multi-drug resistant (MDR) bacteria has lead us to design present study to evaluate phytochemical (total phenolics, flavonoids, tannins), antioxidant and antibacterial activities of methanolic extracts of seed and pulp parts of fresh and dried amla against MDR bacteria (*Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Staphylococcus aureus*, *Escherichia coli*, *Haemophilus influenza*, *Salmonella typhi*) collected from tertiary care hospital. We observed higher levels of phenolics in amla with elevated levels of antioxidant activities. Amla scavenged the DPPH, -OH, H<sub>2</sub>O<sub>2</sub>, superoxide and nitric oxide radicals at very lower concentrations. Kirby-Bauer's disk diffusion used for antibacterial activities of extracts and observed moderate growth inhibitory activity against all multidrug resistant bacteria as compared with standard drug, cefotaxime. The minimum inhibitory concentration (MIC) and minimum bactericidal activity (MBC) values of fresh and dried amla were found to be 50 µg GAE/gm and 60 µg GAE/gm, respectively. The main compounds shown by LC-MS are trigonelline, naringin, kaempferol, embinin, epicatechin, isorhamnetin and quercetin. It is concluded that Indian gooseberry inhibited the growth ESBL produced multi-drug resistant bacteria with their high antioxidant potential.

**Keywords:** Indian Gooseberry, *Phyllanthusemblica L.*, Bacteria, Multi-Drug Resistant, MIC.

## Antibacterial Dual Responsive Aminothiazole Based Copolymeric Nanogels for Controlled Release of Anti-HIV Drug

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**Abstract:** Dual responsive copolymeric poly(*N*-(2-aminothiazolyl) maleamic acid-co-*N*-isopropyl acrylamide) nanogels (PAMNI-NGs) produced from *N*-(2-aminothiazolyl) maleamic acid (AMA) and *N*-isopropyl acrylamide (NIPAM) via a simple free radical emulsion polymerization. The formations of PAMNI-NGs were confirmed by Fourier-transform infrared (FTIR) spectroscopy, dynamic light scattering (DLS), transmission electron microscopy (TEM) and atomic force microscopy (AFM). TEM, DLS, and AFM results showed that PAMNI-NGs are semi-spherical and are found to have the size of around 100 nm. Further, Zidovudine (ZDV), an anti-HIV drug was successfully loaded into the developed PAMNI-NGs using an equilibrium swelling method. The formation of PAMNI-NGs was investigated through FTIR, DLS, AFM and TEM analyses, while the ZDV loaded PAMNI-NGs were confirmed from FTIR and XRD studies. The encapsulation efficiency of ZDV is varied from 33 to 82%. The *in vitro* release studies of ZDV from the PAMNI-NGs were examined in different gastrointestinal tract pH conditions (pH 1.2 and 7.4) at 25° and 37 °C. The presence of aminothiazole functionality in the PAMNI-NGs also showed excellent antibacterial activity towards bacterial strains of Gram-positive (*Bacillus cereus*) and Gram-negative (*Escherichia coli*). Therefore, the *in vitro* release and antibacterial studies revealed the efficiency of PAMNI-NGs towards site-specific drug delivery and antimicrobial applications, respectively.

**Keywords:** *N*-(2-aminothiazolyl) maleamic acid, *N*-isopropyl acrylamide, copolymer, nanogels, controlled release, antibacterial activity.





## Chitosan/Poly(Dimethylaminoethylmethacrylate-co-Hydroxyethylacrylate) Based Semi-IPN Hydrogels and Silver Nanocomposites: Synthesis, Evaluation of Amoxicillin Release Studies and Antibacterial Studies

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**Abstract:** Recently, increasing the interest on chitosan based biomaterials for wound dressings and drug delivery devices, and great deal of work has been dedicated to developing the new smart materials that can be deliver both pharmaceutically active molecules and metal nanoparticles. To take a closer look on this we have been developed different formulations of hydrogels and their silver nano particles along with the amoxicillin. Here, chitosan based poly(DMAEMA-co-HEMA) semi-IPN hydrogels were fabricated via free radical polymerization method using methylene bis acrylamide as cross linker and ammonium persulphate as an initiator. Afterwards, the resultant hydrogels were loaded with model drug amoxicillin alone and along with silver nanoparticles for *in vitro* studies like release of drug in simulated body fluid, and DNA cleavage studies. The samples obtained at different steps were characterized by FTIR, TGA, SEM, TEM and swelling studies. The swelling behavior study by gravimetric measurement indicates the extensive swelling in water and each constituent in the gel has significant effect on both the swelling and drug release rate. The *in vitro* drug release studies indicates the Higuchi model was best fitted for release data compared to Korsmeyer-Peppas's model. The hydrogels with amoxicillin derived silver nanoparticles shows better activity than individual amoxicillin (AMX) and silver nanoparticles. Similarly, the hydrogels with amoxicillin derived silver nanoparticles have better ability to cleave DNA than pure AMX and nano silver.

**Keywords:** Semi-IPNs, Hydrogels, Silver Nanocomposites, Drug Delivery, Antibacterial Studies, DNA Cleavage.

## Grafting Parameters of Essential Amino Acid Grafted Guar Gum and Synthesis of pH Responsive Hydrogels and Their Swelling and Network Studies

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**Abstract:** This study focuses on the synthesis of a new GG-g-PNPA graft copolymer by grafting reaction between guar gum and *N*-Acryloyl-*L*-Phenyl Alanine through free radical polymerization reaction. This grafting is confirmed by the FTIR spectroscopy studies. This work also deals with determinations of various grafting parameters like % grafting (%G), % grafting efficiency (%E), % conversion (%C), % yield (%Y), % Add on (%A), % Homo polymer (%H) and rate of grafting (Rg). The factors controlling graft copolymerization like concentration of monomer and initiator concentrations, reaction temperature and reaction time are discussed. The optimum conditions to get maximum grafting yield (188 %) and grafting efficiency (60.45 %) are evaluated at monomer concentration ( $18.35 \times 10^{-2} \text{ mol/dm}^3$ ); initiator concentration ( $26.32 \times 10^{-2} \text{ mol/dm}^3$ ); Temperature (60 °C); and Time (180 min). The synthesis of GG-g-PNPA-*cl*-(PHEA-*co*-PAMPSA) [GGHA] hydrogels and the structural, swelling and drug release properties of GGHA formulations are evaluated by the determination of various network properties. The maximum swelling capacity of GGHA hydrogels are found in pH 7.4 when compared to 1.2 pH solutions and distilled water. The swelling capacity of GGHA hydrogels is lowered with increasing concentration of salt solution and increasing valence of cation in the salt.

**Keywords:** Guar gum, Grafted parameters, Hydrogel, pH responsive, Network parameters.

### ***In-Vitro, In-Vivo* and Toxicological Evaluation Studies of Curcumine Loaded pH Dependent Sodium Alginate-*g*-Acryloyl Phenylalanine-Polyethylene Glycol Vinyl Ether Hydrogels**

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**Abstract:** pH responsive interpenetrating polymeric network hydrogels (IPN-HGS) composed of natural polysaccharide (sodium alginate) macromolecules and ethylene glycol vinyl ether were designed by a facile free radical polymerization reaction. A hydrophobic drug curcumin was successfully loaded into these hydrogels by the in-situ method. The formulated Curcumin encapsulated hydrogels were well dispersed and shows good bioavailability in physiological buffer. The maximum percentage encapsulation efficiency found at 75%. The formation of graft copolymer (NaAlg-*g*-APA) and chemical structure of hydrogels as well as its chemical interaction with the drug molecules and polymer matrix were investigated by the FT-IR, XRD, TGA and DSC techniques. The surface morphology was explained by SEM. The *in-vitro* drug delivery profile was studied at pH 1.2 (stimulated gastric fluid) and pH 7.4 (intestinal condition) with 0.5% tween 80 dissolution medium at 37°C. *In-vivo* studies of the designed formulations (SAAE 4) revealed that significant superior action on cell death (compared to free curcumin). The results of acute and sub-acute toxicity experiments have supported the oral administration of these formulations. There is no toxicity observed in histopathological study. The *in-vivo* pharmacokinetic studies revealed that SLNs showed long circulation ( $t_{1/2}$ ), better residence time (MRT) and low elimination rate ( $K_{el}$ ) compared with pure drug solution. This study, testify that this formulation is suile for sustained release of the proposed drug.

**Keywords:** Hydrogel, Sodium alginate, Curcumin, Drug delivery, Pharmacokinetics.

## Second Derivative Spectrophotometric Determination of Zinc(II) using 2-Acetyl Pyridine Thiosemicarbazone/Semicarbazone in Biological Samples

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**Abstract:** 2-Acetylpyridine thiosemicarbazone (APT) and 2-acetylpyridine semicarbazone (APS) have been used for the spectrophotometric determination of zinc(II) in aqueous medium. APT and APS react with zinc(II) in acidic medium. The colour reactions between reagents with zinc(II) are instantaneous and the absorbance of complexes remains constant for over 24h. The maximum absorbance ( $\lambda_{\text{max}}$ ), composition (M:L), molar absorptivity and sandells sensitivity of the Zn-APT and Zn-APS complexes respectively are 360, 355 nm, 1:2,  $4.06 \times 10^4$ ,  $8.12 \times 10^3$  L.  $\text{mol}^{-1} \cdot \text{cm}^{-1}$  and 0.0160, 0.080  $\mu\text{gcm}^{-2}$  of Zn(II) respectively. The Zn-APT and Zn-APS systems obey Beer's law for 0.105-1.046, 0.523-5.231  $\mu\text{g/ml}$  of Zn(II) respectively. Large number of cations, anions and complexing agents (e.g. Triethanolamine, thiourea) do not interfere in APT method. The method is successfully applied for the determination of zinc in biological samples.

**Keywords:** Spectrophotometry, zinc determination, 2-acetylpyridine thiosemicarbazone, 2-acetyl pyridine semicarbazone, biological samples.

## Dual Responsive PVA-DMAEMA Hydrogels: Effect of Crosslinking Agent on Swelling and Anti-Cancer Drug Release Properties

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**Abstract:** In this work, pH responsive semi-IPN hydrogels (PVPAD) fabricated from poly(dimethyl amino ethyl methacrylate), DMAEMA and poly(vinyl alcohol), PVA, and acryl amide for anti-cancer drug delivery application. PVPAD hydrogels were successfully prepared by a simple free radical polymerisation using N,N<sup>1</sup>-methylene-bis-acrylamide and bis[2-methacryloyloxy] ethyl phosphate as a cross linkers. The aim of this study was to investigate the effect of crosslinker on swelling behaviour and delayed release of 5-fluorouracil from PVPAD polymeric network. The studied parameters included: monomer concentration, crosslinking agent type & concentration and their overall effect on swelling of the hydrogels, drug loading efficiency, diffusion and *in vitro* release characteristics of 5-fluorouracil from PVPAD hydrogels. These hydrogels were characterized by FTIR, XRD, TGA and SEM spectroscopy.

**Keywords:** Hydrogel, Poly(vinyl alcohol), (2-Dimethylamino)ethyl methacrylate, Stimuli responsive, Drug delivery, 5-Fluorouracil.

## Development of Sodium Alginate/Graphene Oxide Beads: Effect of Heteroionic Crosslinker on *In vitro* Anti-Cancer Drug Delivery

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**Abstract:** Polymeric beads are playing an important role in the field like food and medicine. In the present study, sodium alginate/graphene oxide (NaAlg/GO) hydrogel beads were fabricated by simple ionotropic gelation technique with different ions ( $\text{Ca}^{+2}$ ,  $\text{Mg}^{+2}$ ,  $\text{Ba}^{+2}$  &  $\text{Al}^{+3}$ ) as crosslinking agents. 5-Fluorouracil, an anti-cancer drug successfully loaded in to the NaAlg/GO hydrogel beads. The resultant pristine and drug loaded beads were characterized by Fourier transform infrared spectroscopy (FTIR), X-ray diffraction (XRD) analysis and scanning electron microscopy (SEM). In addition, swelling studies and drug release were performed in pH 1.2 and 7.4 at 37 °C. The anticancer activity of the fabricated beads will be studied by using MTT assay using MCF-7 breast cancer cell lines.

**Key words:** Sodium Alginate, Graphene Oxide, Crosslinker, Cancer, Drug Delivery

## Green Synthesis of Silver Nanoparticles Using Fresh Water Microalgae *Spirogyra sp.* and their Anti-Bacterial Activity

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**Abstract:** Fresh Water Algal biomasses are being used as fertilizer and as a food source for humans and animals. Large scale application of these algae in waste water treatment and bioremediation were also reported as an extension part of industrial applications. In this present study Silver nanoparticles were synthesized through bioreduction of silver ions using fresh water algae *Spirogyra sp.* The sample was collected in Penna river Siddavatam, and cultured in large scale in the net house facility of Department at YVU, YSR Kadapa district, Andhra Pradesh India. Green synthesis of silver ions ( $Ag^+$ ) as shows a yellow color solution to red color extract and these silver nanoparticles synthesis having an absorption peak at 430nm. Further, nanoparticles were characterized by using UV-visible spectrophotometer, scanning electron microscopy (SEM), EDX, Fourier Transform Infra Red (FTIR), Dynamic light scattering (DLS). The Silver nanoparticles average size was estimated around 28-58 nm and the antimicrobial activity of SNPs was tested Gram-positive bacteria as *Bacillus subtilis*, *Staphylococcus aureus*, *Clostridium Sporogenus*. Gram-negative bacteria as *Echeresia Coli*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae* by measuring the inhibition zone and result confirmed that Silver nanoparticles can be an antimicrobial agent against some pathogenic microbes. The results will be presented.

**Keywords:** Fresh Water Algae, Green synthesis, Silver nanoparticles, Antimicrobial activity,

## Substrate Suitability of Minor Millets to Aflatoxin B<sub>1</sub> Elaboration

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**Abstract:** Millets are one of the cereals besides wheat, rice, maize that are recognized as nutriceals which are traditionally consumed as staple food by a large number of people living in arid and semi-arid parts of world. Besides being rich with health promoting phytochemicals they are highly nutritious and known to have potential health benefits. Mycotoxins such as aflatoxins are toxic secondary metabolites produced by *Aspergillus* species. Aflatoxin B<sub>1</sub> is the most carcinogenic one and has been classified as carcinogenic to humans. Aflatoxin contamination of agricultural commodities is becoming more or less inevitable because of the promoting factors in its production such as temperature, moisture, soil properties, insects and rodents attack etc. Wide variation in the AFB<sub>1</sub> content between the minor millets was observed at diff periods of fungal infestation (day 3, 6, 9, 12). Among the millets foxtail millet and kodo millet were more susceptible as high aflatoxin B1 was produced in foxtail millet cultivars when compared to all other minor millets investigated. Little millet (Sama) and finger millet cultivars (Ragivakula and FMAVT-2) were found to offer high resistance to aflatoxin production. Sorghum and maize showed higher aflatoxin B1 production than minor millets. Little millet, Sama showed high phytic acid content which correlated negatively with aflatoxin content. All the millet cultivars at different time points of infection were significantly different for the  $\alpha$ -amylase activity.  $\alpha$ -amylase activity correlated well with respect to the aflatoxin production in foxtail millet (Krishnadevaraya), sorghum and maize. Aflatoxin contamination is a persistent serious threat to man irrespective of the measures taken to control it, and in these circumstances minor millets with no natural occurrence and good resistance to fungal attack, offer one of the solutions to combat aflatoxin contamination and can be regarded as low risk agricultural commodities.

**Keywords:** aflatoxin, Millets, nutriceals, Little millet



## Zestoretic A Anti-Hypertensive Drug Shows Adverse Effects on Fertility in Male Rats

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**Abstract:** Zestoretic, is a combination of lisinopril and hydrochlorothiazide commonly used as anti-hypertension drug in humans. No reports are available to know the role of zestoretic effects on reproductive system in men. The present study focused to see the effects of zestoretic on reproductive behavior and sperme quality in Wistar rats. Zestoretic (lisinopril varied concentrations + hydrochlorothiazide 12.5mg) at a dose of 25, 50 and 100 mg/Kg body weight were administered orally to three different groups of mature males (90 days old) consisting of each 4 animals on day 1, 3, 5, and 7 and sacrificed to check the fertility parameters on day 8. Control males were maintained by administering water orally. The sperm parameters like daily sperm count, motility, viability, sperm functional test (HOS Test) along with weight of reproductive organs were measured in all the rats. Significant decrease ( $P < 0.005$ ) in the daily sperm count, motility and viability was observed in the experimental groups in a dose dependent manner when compared to controls. HOS test clearly shown the dose dependent effect of zestoretic and its intensity in a way with increased number of abnormal/damaged/inactive sperm. The significant ( $P < 0.005$ ) reduction in the weight of reproductive organs such as prostate gland, seminal vesicle, testis and epididymis in a dose dependent manner is correlated with decreased sperm quality in the zestoretic administered experimental rats. This study is directly evidenced the side effects of zestoretic on male reproductive health by lowering the reproductive organs weight thereby producing low quality sperm.

**Keywords:** Zestoretic, anti-hypertension, sperm quality, reproductive organs, infertility

## Preparation, Characterization of Guar gum Polymer Based Silver-Nanocomposite-Hydrogels for Anticancer Drug Release, and Antimicrobial Applications

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**Abstract:** In this work, we fabricated a pH/temperature responsive nanocomposite hydrogels (NCH) from guar gum-graft-polyacrylamidoglycolic acid (GG-PAGA) polymer with silver nanoparticle (SNPs) containing hydrogels. These NCHs were formed by cross-linking between cis-diol groups on guar gum molecular chains with NaBO<sub>2</sub> (sodium metaborate), obtained from NaBH<sub>4</sub> which also induces the silver nuclei growth by reduction through a rapid and simple way. The stability and formation of SNPs inside the hydrogel was confirmed by the UV-vis spectrum, and their size in nano form (<10 nm) anchoring on the network was determined by transmission electron microscopy (TEM). Furthermore, the presence of N (indicates the grafting), B (indicates the cross-linking), and Ag (indicates the *in-situ* SNPs formation) by the EDX color mapping. The as-prepared NCHs have been utilized to deliver a 5-fluorouracil (5-FU), an anticancer drug and also tested their potential antimicrobial efficiency against *Bacillus subtilis* (*B. subtilis*) and *Salmonella ebony* (*S. ebony*). The cross-linking network structure in the NCHs were demonstrated by scanning electron microscopy, which confirmed the porous 3D network formation. Furthermore, the different network parameters ( $M_c$ ,  $\chi$ ,  $\xi$ ,  $\phi$  and  $D$ ) were investigated in terms of average molecular weight between cross-linkers/network, swelling characteristics, and evaluated to assess the release profile of 5-FU drug. The changes in the obtained NCHs such as functional-interactions, thermal, and morphological properties were identified by Fourier transformation infra-red, Differential scanning calorimetry, Thermo gravimetric analysis, and X-ray diffraction study. The NCHs possess ionizable groups and these were responsible to exhibit sol-gel behavior due to pH and temperature effect, therefore the mesh size, and molecular weight of polymer cross-link network has been greatly influenced in the NCHs. As a result, the swelling ratio of NCHs showed maximum at higher pH and minimum at lower pH; also enhanced the 5-FU loading and encapsulation efficiency (i.e. 56%). Furthermore, the NCHs showed higher *in-vitro* release of 5-FU at pH 7.4 than at pH 1.2 and 37 °C. Moreover, the 5-FU release was

## Metal-N-Heterocyclic Carbene Catalyzed Synthesis of bis Benzofused Heterocycles

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**Abstract:** Direct arylation has emerged as an increasingly viable alternative to traditional cross-coupling techniques such as Sonogashira, Suzuki-Miyaura, Stille, Kumada and Negishi reactions have been developed with a variety of metal catalysts. Since, all these processes require the functionalized starting materials, aryl halides on one side and organometallic derivatives on the other end, which are frequently not commercially accessible or are relatively expensive. In these reactions, the organometallic reagent of traditional cross-coupling reactions is replaced by a simple arene (Ar-H), thus minimizing the number of synthetic manipulations prior to cross-coupling. Electron-rich and electron deficient heterocycles, as well as simple benzenes. Since a decade our group effectively involving N-heterocyclic carbene (NHC's) catalyzed C-C and C-N bond forming reactions,<sup>1-4</sup> in view of the great importance of NHC's we focus on the metal-NHC catalyzed oxidative homo/cross C-H/C-H coupling reactions between benzofused heterocycles and aryl/heteroaryl halides either two (hetero)arenes through 2-fold C-H activation.

**Keywords:** Metal-N-Heterocyclics, Carbene, cross-coupling techniques, C-H activation.

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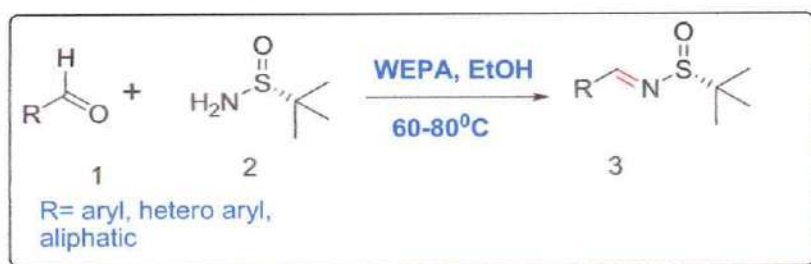
## A highly Sustainable Synthesis of Chiral *tert*-butane Sulfinyl Imines in Water Extract of Pomegranate Ash under Metal Free Condition

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**Abstract:** The chiral *tert*-butanesulfinylimines developed by Ellman et al. become prevailed substrates in organic synthesis. These are proved as effective auxiliaries in several reports for making chiral amine-containing precursors and biologically significant complex molecules. Moreover, (*S*)- and (*R*)-*tert*-butanesulfinamides and (*S*)- and (*R*)-*a*-methylbenzylamines are widely accepted chiral ammonia equivalents among all the chiral amine substrates. In this connection we have recently developed a versatile procedure for the effective synthesis of sulfinyl aldimines from aryl/heteroaryl/aliphatic aldehydes and *tert*-butanesulfinamide by using water extraction of pomegranate ash (WEPA) as catalyst and media. Simple operation, excellent yields in a short reaction time, eco-friendly solvent/catalyst, environmental beneficial aqueous media, absence of external additives, metal-free condition are the notable advantages of this method.

**Keywords:** Sulfinyl Imines, Pomegranate Ash, Eco-friendly, Catalyst,



**Scheme:** WEPA catalyzed synthesis of chiral *tert*-butane sulfinyl imines.

## Design and Synthesis of Phaspomolebdinic acid Embedded Composite Membranes Based on Polymeric Sulphonic acid Grafted Pectin for Fuel Cell, Drug Delivery and Toxic Metal Ion Removal Application

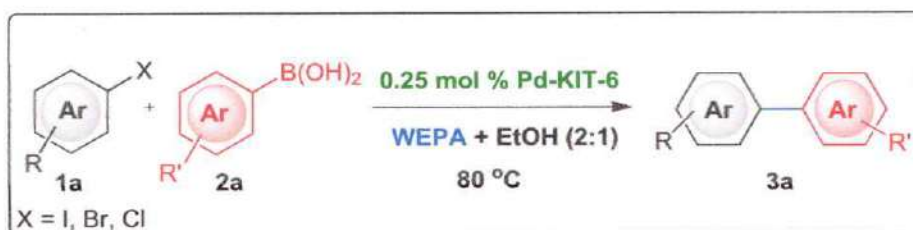
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**Abstract:** Phaspomolebdinic acid embedded composite membranes were fabricated by polymeric sulphonic acid grafted pectin graft copolymers by blending with poly(vinyl alcohol) by solution casting method. Graft-copolymers were synthesized from pectin, a carbohydrate polymer, with (2-acrylado-2-methyl-1-propanesulphonic acid) and (sodium 4-vinylbenzenesulfonate) by using KPS potassium persulfate as an initiator. The effect of variables like concentration of initiator, concentration of monomer, temperature and time has been studied. Graft copolymers and the developed membranes were successfully characterised by Fourier transform infrared spectroscopy, scanning electron microscopy, and X-ray diffraction studies. These membranes were evaluated fuel cell application as proton exchange membrane and studied ion-exchange capacity, water uptake, methanol permeability and proton conductivity. In addition, these membranes are successfully utilized for the anti-cancer drug (5-fluorouracil) delivery as well as toxic metal ion ( $\text{Cu}^{2+}$  &  $\text{Ni}^{2+}$ ) removal.

**Keywords:** Polyacid, Pectin, Fuel Cells, Drug Delivery, Toxic Metals, Adsorption.



**Scheme:** Synthesis of biaryls.



## Hydrogeochemical Studies of Simhadripuram Mandal, YSR Kadapa District, Andhra Pradesh

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**Abstract:** Assessment of water quality has been carried out to determine the sources of dissolved ions in groundwater. Ground water is clean but it depends upon quality and quantity of minerals dispersed and dissolved in it. Quality of groundwater in Simhadripuram Mandal of YSR Kadapa District, a semi-arid region of south India is evaluated for its suitability for drinking and irrigation purposes. The study area falls in the Survey of India Toposheet nos. 57 J/02 and J/06 on 1:50,000 scale. Geologically, the middle Proterozoic Cuddapah Super group and Kurnool Group of rocks underlie most of the study area. The main lithologic units consist chiefly of quartzite, dolomite, shale, and the study area contains layers of basic volcanic rocks, including sills of trap and trap conglomerate with volcanic pellets. Twenty two samples of ground water using for drinking and agricultural purpose were collected from either hand pumps or open wells at different places from the study area, during the month of December 2019. The pH of ground water in the study area is ranging from 7.5 to 9.3. The total hardness of the groundwater in the study area is ranging from 37 to 4730 mg/l. Calcium concentration of Groundwater in the study area is ranging from 18 to 194 mg/l during the post-monsoon period. Magnesium concentration of Groundwater in the study area is ranging from 24 to 182 mg/l during the post-monsoon period. Chloride concentration of the ground water in the study area ranging from 49 to 614 mg/l during post-monsoon period. Bicarbonate concentration of the groundwater in the study area is ranging from 122 to 1610 mg/l during the post-monsoon period.

**Keywords:** Groundwater, Hydrogeochemistry, Nambulapulakunta, and Anantapur District

## Soil Organic Carbon and Soil Respiration Rate in A Dry Deciduous Forest of Kadapa Hill Ranges, Andhra Pradesh, India

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**Abstract:** The interaction of soil-vegetation systems in forests play an important role in terrestrial carbon cycle as they act as active carbon sinks. Especially forest soils under natural vegetation are regarded as one of the major sinks of carbon. The objective of the study is to estimate the Soil organic carbon (SOC) and soil respiration (SR) in a dry deciduous forest of Kadapa hill ranges. Nine soil samples were collected randomly and at each site soil samples were collected at surface layer (0-10 cm) and sub surface layer (10-30 cm). SOC was analysed by Walkley-Black method and soil respiration by alkali absorption method. SOC was in the range of 1.33 to 1.81% at top surface layer and 0.83 to 1.51% in the below surface layer and thus the SOC values got decreased with increase in soil depth. A positive trend but not significant relationship was observed between SOC and SR and a significant negative correlation was noticed between SOC and soil bulk density. While SR showed a positive trend with soil temperature. The results reveal a definite linkage between SOC and rich forest diversity leading to sustainable conservation of forests and ecosystem services.

**Table 1** Details of physico-chemical parameters, mean and range of soil organic carbon and soil respiration values of soils at varied depths in a dry deciduous forest.

Soil depth (cm)	pH	Electrical conductivity ( $\mu\text{sc/cm}$ )	Temperature ( $^{\circ}\text{C}$ )	Soil Moisture (%)	Mean Soil organic carbon (%)	Bulk density ( $\text{g/cm}^3$ )	Soil respiration $\text{Co}_2/\text{mg/m}^2/\text{h}$
0-10	5.3-6.2	163.7	26.5-33.2	3.37	1.67 $\pm$ 0.17	1.35	113.91
10-30	5.6-6.0	150.2	25.8-32.2	5.40	1.1 $\pm$ 0.23		

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## Tree Diversity and Edaphic Factors Relationship in Srilankamalleswara Wildlife Sanctuary, Andhra Pradesh, India

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**Abstract:** A total of 133 tree species representing 7262 tree individuals was recorded in Sri Lankamalleswara wildlife (SLKM) sanctuary. The edaphic factors like SOC, pH, and Nitrogen and altitude of the forest site have contributed significantly to the variation of tree diversity. The edaphic factors like SOC, pH, Nitrogen, Phosphorus and Potassium were estimated by standard methods. Principal Component Analysis (PCA) indicated that F1 axis accounted for 59% of variation for soil variables and the F2 axis accounted for 16% of variation for altitude. The range of Nitrogen values was 2-32 ppm and was found to be lower than the other dry forests of Southern Eastern Ghats. A strong positive relationship between soil potassium, phosphorus and nitrogen with soil organic carbon was recorded. The low values of nitrogen and phosphorus in these forest soils may explain the dominants of leguminaceae trees. The rich diversity and symbiotic association with mycorrhizae strengthen the sustainable forest conservation efforts being carried out in the wildlife sanctuary.

**Table 1:** Physico-chemical properties of soil in sri Lankamalleswara wild life sanctuary (SLKM) in Kadapa hill ranges.

S.No	Soil type	Shallow, Red ferruginous loam
1	Soil pH	5.14-6.82
2	Soil organic carbon	0.75±0.03% (31.72 t/ha)
3	Bulk density	1.34-1.54 g/cm <sup>3</sup>
4	Electrical conductivity	33 µsiemens/cm
5	Soil nitrogen	39.3 kg/ha
6	Soil phosphorus	17.34 kg/ha
7	Soil potassium	97.32 kg/ha

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## Evaluation of Water Harvesting Structures in Watershed Programme in YSR Kadapa District, Andhra Pradesh, India

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**Abstract:** An evaluation of Water Harvesting Structures (RWH) in watershed programme has been carried out in YSR Kadapa district. To mitigate drought effects under drought-prone area programme watershed development is taken up in Andhra Pradesh. Main aim of the programme is to increase soil moisture and groundwater. In YSR Kadapa district since 2016 there are more than 350 watersheds are developed, only five watersheds are taken up for evaluation of water harvesting structures. Data were collected from primary stakeholders pertaining to land and water resources. In 2017-18 area irrigated under Kharif before construction of watersheds are 61.20 hectares and after construction of watersheds in Kharif season area irrigated 75.70 hectares. Change of area irrigation in this season is nearly 14.5 hectares i.e. 23 percent. In Rabi season area irrigated before construction of the watershed is 46.3 hectares and area irrigated after construction of watershed is 57.5 hectares. Change of area irrigation in Rabi season is 11.2 hectares i.e. 24 percent. Before construction of the watershed total number of dug wells and bore wells are 37 and 48 and after the construction of the watershed total number of dug wells and bore wells are 37 and 79 and increase of wells nearly 31 i.e. 21 percent. The analysis indicated that there was an increase in all factors in the watershed area compared to non-watershed area. Lastly, it is suggested that RWH might be developed at appropriate areas and it is fundamental to set up vegetation for ideal accomplishment of the program.

**Keywords:** Artificial recharge structures, Watersheds, Kharif and Rabi seasons, Check dams.



## Non Carcinogenic Effect of Nitrates ( $\text{NO}_3^-$ ) in Drinking Water Surrounding Inactive Mine Lands in Cuddapah Basin, Andhra Pradesh, South India.

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**Abstract:** 50 groundwater samples were collected and analysed for major cations, anions, fluoride and nitrate in the Southwestern parts of Cuddapah basin (SW). Nitrate concentration ranges between 0.14 to 589 mg/L. Around 62.5 % of the groundwater exceed the permissible limit of 45 mg/L. Groundwater is not potable in terms of nitrate contamination hence health risk assessment has been carried out in this area. As per the USEPA guidelines hazard Quotient (HQ) and total hazard index (THI) has been evaluated. HQ values of nitrates varied from 0.001 to 14.6 (adults), 0.002 to 14.36 (children), 0.01 to 11.18 (infants). Therefore, proper ground water management techniques have to be implemented to mitigate ground water contamination and Government should take necessary steps to supply alternate drinking water.

**Keywords:** Groundwater, Cuddapah Basin, Nitrate, Kelly's Ratio

## Groundwater Quality Characterization in and Around Cement Industrial Zone, Yerraguntla Mandal, Andhra Pradesh, South India

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**Abstract:** The main objectives of this study is to evaluate characterization of groundwater quality and fluoride and nitrate health risk assessment and to ascertain ground water quality for drinking, irrigation purpose and associated health risk assessment in and around Yerraguntla, Y.S.R district, South India. 40 ground water samples were collected from bore wells, analyzed for several cations and anions. Nitrate concentration ranges between 82.38 mg/L to 751.15 mg/L. Around 43% of the groundwater samples exceeded the World Health Organization (W.H.O) standards of nitrate (45mg/L). Fluoride concentrations varying from 0.49 mg/L to 5.81 mg/L. 48% of the samples are above the fluoride permissible limit of WHO standards (1.5mg/L). Irrigational quality indices such as Percent Sodium (%Na), Sodium Adsorption Ratio (SAR), Residual Sodium Carbonate (RSC), Magnesium Hazard (MH), Permeability Index (PI), Soltan classification (R1, R2), Kelly's Ratio (KR), Chloroalkaline Indices (CI), and Corrosivity ratio (CR) have been determined. Piper diagram reveals that most of the water is of mixed  $\text{Ca}^{+2}$ - $\text{Mg}^{+2}$ - $\text{Cl}^-$  and  $\text{Ca}^{+2}$ - $\text{Na}^+$ - $\text{HCO}_3^-$  type. Non- carcinogenic health risk of nitrate and fluoride was also evaluated using United State Environmental Protection Agency (USEPA) method. THI values ranged from 0.39 to 18.26 (adults), while THI values for children and infants varied between 0.40 to 19.02 and 0.30 to 14.49 respectively. Hence proper ground water management techniques have to be adopted to mitigate ground water contamination and Government should take necessary steps to supply alternate drinking water.

**Keywords:** Groundwater, Cement, Fluoride, Nitrate, Kelly's Ratio



## Effect of Lactose on Production of Cellulase by *Aspergillus Unguis* in Solid State Fermentation on Groundnut Fodder

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**Abstract:** Nowadays, the use of agricultural residues, as the cheap substrate for the production of value-added products, is of high interest for the researchers and practitioners. Cellulase is a relatively expensive and a very important industrial enzyme where in this study was produced from groundnut fodder in solid state fermentation. In the previous experiment, production of cellulase by *A. unguis* was studied at only 1% (w/v) of lactose supplementation. Further experiments were conducted to determine the effect of lactose at various concentrations such as 0.5%, 1.0%, 1.5%, 2.0% and 2.5% (w/v) on production of cellulase by *A. unguis*. Groundnut fodder with 0.5% lactose supplementation by *A. unguis* gave the maximum FPase titers of 7.35 FPU/g groundnut fodder on 4<sup>th</sup> day of incubation. Lactose at 2% level showed higher yields of CMCase on 2<sup>nd</sup> day of incubation (23 U/g of groundnut fodder). Maximum  $\beta$ -glucosidase production (32.40 U/g of substrate) was occurred on 3<sup>rd</sup> day of incubation at 1.5% lactose concentration in SSF by *A. unguis*. Lactose at concentration of 2.0% yielded maximum protein content with 147.5 mg/g of groundnut fodder on 1<sup>st</sup> day of incubation.

**Keywords:** *Aspergillus unguis*, Groundnut fodder, Solid state fermentation, Cellulase, FPase, CMCase,  $\beta$ -glucosidase

## Fuels from Green Algae

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**Abstract:** Regular depletion of non-renewable fuels such as fossil fuels alerting the society to look in to renewable fuels. In general, algae were used for the purpose of food, nutraceuticals, medicine with some extent biofuels etc. Specifically, green algal species are useful due to their photosynthetic ability which in turn accumulates more biomass. Most of the algal species belong to aquatic group and lived in both fresh water and marine conditions. They have both uni and multi cellular nature with short life span. Recently, green algal species are also using to produce biofuels such as bioethanol, biohydrogen, biobutanol, biodiesel etc. In our laboratory, green algal species such as *Chlamydomonas reinhardtii*, *Chlorella vulgaris* and *Chlorococcum minutum* were using to produce bioethanol as well biohydrogen through various physico-chemical parameters. Particularly we are using vitamins, nano particles etc. to improve biomass in turn biofuel production. This work may be useful for commercial level production of biofuels.

**Keywords:** Energy, Fuels, Green Algae, Biofuels.



## Antibacterial Polyelectrolyte Hydrogels with Polysaccharides and Reduced Graphene Oxide via Green Method; Membrane and Oxidative Stress

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**Abstract:** A simple and green method has been employed for the preparation of reduced graphene oxide (rGO) in polyelectrolyte complex hydrogels (PECHs) from xanthan gum (XG) and chitosan (CS). In this study glucuronic acid  $\delta$ -galactone (GDL) was used as acidifying agent for the formation of PECHs and fenugreek seed extract as preparation of rGO. As synthesized rGO was characterized by Fourier transform infrared spectroscopy (FTIR), UV-Visible (UV-Vis) spectra X-ray diffraction (XRD). The developed rGO-PECHs were characterized by FTIR, and XRD techniques to confirm the formation and structural interactions between rGO with PECHs. The microstructure of rGO-PECHs was confirmed by scanning electron microscopy (SEM). In future by we will study biological performance of in terms of biocompatibility and antibacterial property against both gram-positive and gram-negative bacteria via membrane and oxidative stress for possible application in wound dressing.

**Keywords:** rGO, polysaccharides, polyelectrolyte complex, hydrogel, antibacterial, cytocompatibility.

## ***Madagascar Periwinkle Leaves as a Green Source for Facile Synthesis of Silver Nanoparticles and their Efficacy Towards Catalytic Activity***

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**Abstract:** Biosynthesis of nanoparticles emerged into considerable offshoot approach of nanoscience as herbal extracts can potentially eliminate the toxicity problem and gained attention due to growing demand to create a secure, low-cost, non-toxic and eco-friendly route for synthesis of nanomaterials. In the current investigation, we report the reducing and capping potential of aqueous extract from leaf infusion of *Catharanthus roseus* for the synthesis of silver nanoparticle (AgNPs). The inclined properties of prepared AgNPs were typified by optical examination, UV-Vis spectroscopy, FT-IR, SEM-EDAX, and X-ray diffraction (XRD) studies. The color change of the reaction mixture from light yellow to dark brown was observed within 60 minutes, which indicated the formation of silver nanoparticles. UV-visible spectroscopic analysis showed an absorption peak at 420 nm. The average range of particle size calculated using dynamic light scattering measurements (DLS) was found to be 18.17 nm. The rapid electro kinetic behavior of the silver was evaluated using zeta potential (approx. -27.7 mV). The catalytic efficiency of the prepared leaf broth AgNPs was also investigated on methylene blue (MB) dye degradation and the result demonstrates the completion of degradation process at the end of 5<sup>th</sup> h, signifying excellent catalytic properties.

**Keywords:** *Catharanthus roseus*, Methylene Blue dye, DLS, XRD.

## Carbon Re-breath for Higher Mileage Energy System

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**Abstract:** Present day conventional energy is a consequence of burning of fossil fuels. During the process apparently the fossil fuels does not burn completely. These incompletely burned fossil fuels produce GHG. Furthermore the energy thus produced will not be completely consumed. Present study elucidates an enhanced energy system with assurance of complete burnt of fossil fuels along with complete consumption of energy produced by any source. The versatile behaviour of thermal energy storage applications of zeolites had lead a path way to Zeoengines. When compared to water it can hold nearly 30 times more heat, thus it is the best and efficient way to store complete consumption of heat energy. Natural zeolites like natrolite, analcime, apophyllite, chabazite, heulandite mesolite etc, have a unique property of releasing heat by absorption of water and liberate water vapour on heating. The exhaust of the engine is passed through the specially prepared mixed bed phases resulting for trapping of unburned fluid and fluidized gasses. This trapped fuel is enhanced and enriched by Wave blasting and re-injected into the engine by non-return valve (NRV) system which is automated with integration of SCADA. This system result an additional high energy, nearly 10-20% higher mileage along with low GHGs. By adopting this system in gas based or diesel based power plants PLF can be increased. An integrated closed cycle of adsorption and liberation of heat manages industrial cooling and heating system, thus saves energy by complete consumption of heat produced by any energy system. The system is a proved long lasting, eco friendly, cost effective system.

**Keywords:** Zeolite, Thermal energy, Analcime, Apophyllite, Chabazite.





## Facile Hydrothermal Synthesis of RGo/PtRu Nano Catalyst for Electro Methanol Oxidation

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**Abstract:** PtRu nano spheres (NSs) were uniformly deposited on reduced graphene oxides (rGOs) sheets by using simple a one pot hydrothermal method. Synthesized binary nano catalyst were characterized through X-ray power diffraction (XRD), Fourier transformed infrared spectroscopy (FT-IR), Raman Spectroscopy, Scanning electron microscopy (SEM), Energy Dispersive X-ray spectroscopy (EDAX) and Transmission electron microscopy (TEM). The electrochemical properties tested by cyclic voltammetry (CV), Chronoamperometry (CA). RGO/Pt-Ru nano catalyst exhibited more efficient electro methanol oxidation than the mono catalysts such as rGO/Pt, rGO/Ru and bare Pt. The bimetallic nano catalyst (rGO/PtRu) better suitable for electro methanol oxidation for direct methanol fuel cells (DMFC) due to synergistic effect of individual rGO, Pt and Ru catalysts.

**Keywords:** Hydrothermal method, Methanol oxidation, PtRu nano catalyst, Synergistic effect.



## Nanocomposite Membranes of Sodium Alginate-MnO<sub>2</sub> Nanorods for Dehydration of Isopropanol

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**Abstract:** Nanocomposite membranes of sodium alginate - manganese oxide nanorods [NaAlg-MnO<sub>2</sub> NRs] were prepared by incorporating nanorods of manganese oxide, which are prepared by a simple hydrothermal method, by solution casting method and further cross-linked with glutaraldehyde. The effect of MnO<sub>2</sub> NRs loading on mechanical strength and thermal stability of the derived nanocomposite membranes was investigated. These results suggested that the mechanical and thermal stability of nanocomposite membranes were improved over pristine NaAlg membrane. The developed membranes were assessed for intermolecular interactions using Fourier transform infrared (FTIR). Further, X-ray diffraction (XRD) studies were also performed to evaluate the morphology of the MnO<sub>2</sub> NRs and distribution of these nanorods in NaAlg matrix membrane. The % degree swelling (DS) was calculated for all membranes in isopropanol-water mixtures at 30 °C to evaluate the ability of these membranes for pervaporation (PV) separation applications. The membranes were tested for suitability to dehydrate isopropanol by PV. The effects of feed composition as well as amount of nanorods loading on PV separation performance of these membranes were evaluated in terms of flux and selectivity. These results suggested that the nanocomposite membranes have shown improved separation of the water from water-isopropanol mixtures than the NaAlg membranes.

**Keywords:** Pervaporation; Nanocomposite membrane; Sodium alginate; MnO<sub>2</sub> nanorods

## Nanoporous Reduced Graphene Oxide Supported Pt-TiO<sub>2</sub> and Pt-Mn<sub>3</sub>O<sub>4</sub> Nanocomposites for Fuel Cell Reactions

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**Abstract:** Electrochemical methanol oxidation reaction (MOR) and oxygen reduction reactions (ORR) are important anodic and cathodic reactions, respectively in proton exchange membrane fuel cells. Electrocatalysts which can deliver promising activities towards MOR and ORR are highly sought to realize fuel cells commercialization. Pt-based catalysts finely dispersed on conductive carbon supports are commonly utilized as MOR and ORR catalysts. Many strategies are focused on manipulating the structure of Pt-based catalysts and developing promising carbon based supports to improve the electrocatalytic activity. In this study, we deposited Pt, Pt-Mn<sub>3</sub>O<sub>4</sub> and Pt-TiO<sub>2</sub> nanocomposites on reduced graphene oxide support (Pt/RGO, Pt-Mn<sub>3</sub>O<sub>4</sub>/RGO and Pt-TiO<sub>2</sub>/RGO). The morphology and structure of the resulting catalysts are studied by transmission electron microscopy (TEM), X-ray diffraction (XRD) and scanning electron microscopy (SEM). The electrocatalytic activities of the fabricated catalysts are evaluated for MOR and ORR and will be presented.

**Keywords:** Fuel cells, Oxygen reduction reaction, Pt-Cu/RGO, Electrocatalysis.

**Acknowledgement:** One of the authors (YCS) thank the Andhra Pradesh Pollution Control Board (APPCB), Andhra Pradesh for Junior Research Fellowship (APPCB-RF01).

## Decoration of Flower like Pt-Cu Nanoparticles on Reduced Graphene Oxide for Electrocatalytic Oxygen Reduction Reaction

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**Abstract:** Ultrathin Pt-based nanoparticles shows promising activity towards oxygen reduction reaction (ORR) and are currently in demand to realize fuel cells as power generating devices.<sup>[1,2]</sup> In this presentation, we show a simple method for the fabrication of flower-like Pt-Cu nanostructures deposited on reduced graphene oxide (RGO) supports. Moreover, combination of flower-like Pt-Cu nanostructures with graphene oxide (GO) could further increase the electrocatalytic performance. A one-pot chemical reduction method utilizing ethylene glycol both as a solvent and reducing agent without any additional involvement of surfactants and pH maintenance was developed to fabricate Pt-Cu nanoparticles on RGO support. As prepared Pt-Cu/RGO catalysts were characterized by various techniques, such as X-ray diffraction spectroscopy (XRD), transmission electron microscopy (TEM), energy dispersive X-ray spectroscopy (EDX), scanning electron microscopy (SEM), Raman spectroscopy, cyclic voltammetry and linear sweep voltammetry (LSV). The as-prepared flower-like PtCu/RGO nanostructures exhibited significantly higher specific activity than commercial Pt/C towards oxygen reduction reaction (ORR). The present chemical reduction method will be significantly helpful to the further design nanocomposites with desired properties relevant to ORR applications.

**Keywords:** Fuel cells, Oxygen reduction reaction, Pt-Cu/RGO, Electrocatalysis.

**Acknowledgement:** One of the authors (BS) thank the Department of Science and Technology, New Delhi for the INSPIRE fellowship (IF160123).

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## Enhanced Electrocatalytic Formic Acid Oxidation on Educed Graphene Oxide-Supported Core-Shell Structured Au@Pd Nanocomposites

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**Abstract:** CO tolerant anode electrocatalysts with promising catalytic activity are necessary to realize direct formic acid fuel cells (DFACs) as promising renewable energy sources. Herein, we developed bimetallic Au<sub>Core</sub>-Pd<sub>Shell</sub> nanoparticles supported on a reduced graphene oxide (RGO) support (Au@Pd/RGO) with an average particle size of 5.7 nm with fairly uniform dispersion. The as prepared electro catalysts were characterized by X-ray diffraction (XRD), transmission electron microscopy of low and high resolution (TEM&HR-TEM) with selected area electron diffraction (SAED) patterns, Energy dispersive X-ray spectroscopy (EDS), and cyclic voltammetry (CV). The prepared nanoparticles was examined the catalytic efficiency towards formic acid oxidation reaction (FAOR). The electrocatalytic activity of nanoparticles was recorded in a mixed solution of N<sub>2</sub> saturated 0.5 M H<sub>2</sub>SO<sub>4</sub> and 0.5 M HCOOH at room temperature (RT). Au@Pd/RGO catalyst showed higher catalytic performance and more stability towards the formic acid electro oxidation compared to Pd/RGO, Au-Pd/RGO and Au-Pd/MWCNT catalysts.

**Keywords:** Electrocatalysts, Core-Shell, Au@Pd/RGO, cyclic voltammetry.

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## Marker Pen Lithography Base PEDOT: PSS, Platinum Counter Electrode Development: Easy, Cost-Effective Route for Dye Sensitized Solar Cell

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**Abstract:** Progress in development of cost-effective counter electrodes (CE) for dye sensitized solar cells is increased within a short time period. Herein, a cost-effective approach namely marker pen lithography (MPL) using commercially available refillable marker pen process is demonstrated for preparation of counter electrodes for DSSC. The catalyst solutions are filled into ink tank, fabricated CE is examined through various characterization techniques. Uniform distribution is perceived through scanning electron microscope (SEM), atomic force microscope (AFM) studies, resulted to higher average surface roughness. Cyclic-Voltammetry (C-V) and Electrochemical impedance spectroscopy (EIS) testing revealed as superior electrocatalytic activity and lower interfacial resistances, etc. The power conversion efficiency (PCE) of DSSCs made with platinum gave of 4.25%, and PEDOT: PSS resulted to 3.00 %. The results are discussed.

**Keywords:** PEDOT, PSS, Pen Lithography, Cyclic-Voltammetry.



## Development of Flavone-Cyanoacetamide Hybrids as Innovative Multifunctional Therapeutic agents for Alzheimer's Disease

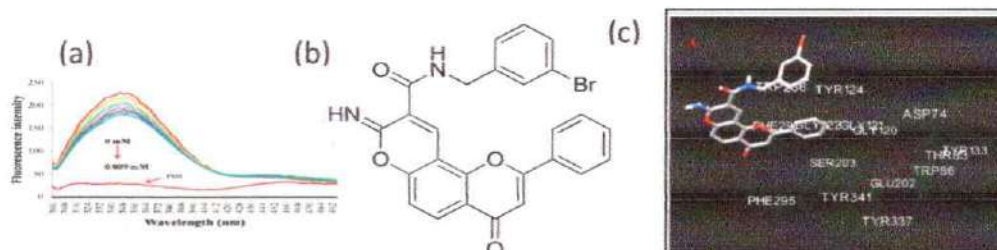
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**Abstract:** Alzheimer's disease (AD) is an irreversible, progressive neurodegenerative brain disorder that assaults the central nervous system<sup>1</sup>. Facing the complex etiology of AD, at present researchers are focused on developing new multi-target directed ligands (MTDLs) to fight back against this disease. In line with this modern paradigm of AD, a congeneric set of compounds composed of flavone and cyanoacetamide moieties have been synthesized and evaluated as multifunctional agents against AD<sup>2</sup>. Biological evaluation demonstrated that compounds with N-(1-phenylethyl), N-(2-Bromobenzyl), N-(3-Bromobenzyl), N-(4-(tert-Butyl) benzyl) and -N-(2-(2-methoxyphenoxy) ethyl) moieties exhibited excellent inhibitory potency and selectivity to AChE (IC<sub>50</sub> of 0.271 ± 0.012 to 1.006 ± 0.075 μM), good anti-oxidant activity, strong modulation effects on self-induced Aβ aggregation, low cytotoxicity, and neuroprotectivity in human neuroblastoma SK-N-SH cells.



**Experimental Approach**

**Flavone Derivative**

**Computational Approach**

Further, an inclusive study on the interaction of active compounds with AChE using fluorescence, circular dichroism, and molecular docking methods suggested that these derivatives bind strongly to the peripheral anionic site of AChE. Overall, the multifunctional profiles and strong AChE binding affinity highlight these compounds as promising prototypes for further pursuit of innovative MTDLs against AD.

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**Pd(5%)-KIT-6, Pd(5%)-SBA-15 and Pd(5%)-SBA-16 Catalysts in Water Extract of Pomegranate Ash: A Case Study in Heterogenization of Suzuki-Miyaura Reaction Under External Base and Ligand Free Conditions**

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**Abstract:** Pd-catalysed Suzuki-Miyaura cross-coupling (SMC) reactions have become most essential tools in synthetic organic chemistry for making biaryls. SMC reactions are applied extensively for the synthesis of natural products, pharmaceuticals, functional materials, polymers and nucleoside analogues. Herein we have developed heterogenization of Suzuki-Miyaura cross-coupling (SMC) using mesoporous silica supported Pd-nanoparticles (Pd-NPs) under ligand and external base free conditions. Pd-mesoporous silica catalysts such as Pd-KIT-6, Pd(5%)-SBA-16 and Pd(5%)-SBA-15 were synthesized and studied for SMC in water extract of pomegranate ash (WEPA). The catalyst Pd(5%)-KIT-6 showed better activity than others. The successful reusability of Pd(5%)-KIT-6 upto five recycles indicates high stability of the catalyst, conveys pure heterogenous mechanism over unavoidable homogenous mechanism of heterogenous catalysts in SMC. The wide choice of substrates, high stability of the catalyst in green and renewable medium & base systems, and absence of ligand are the notable futures of this investigation.

**Keywords:** Biaryls, Suzuki-Miyaura, Pomegranate Ash, Eco-friendly, Pd-Catalyst,



## Design and Development of New N-Heterocycles with Diverse Biological Properties

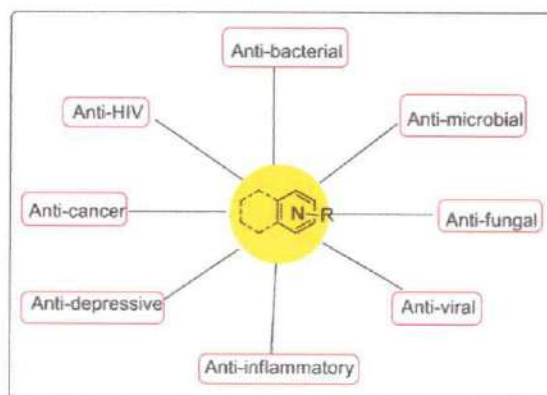
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**Abstract:** Heterocycles constitutes a major part of biologically active compounds. Among them, nitrogen scaffolds play a pivotal role.<sup>1</sup> Most of the isolated natural products,<sup>2</sup> and pharmaceutical ingredients<sup>3</sup> possess N-building blocks. Worthy to mention purines and pyrimidines are the essential components of nucleic acids. Similarly, other simple to complex nitrogen containing nuclei including pyridine, pyridazine, indole, quinoline derivatives etc., deploy distinct natal activities. Here in our present study, we prepared distinct series of pyridine, quinoxaline and triazine analogues and carried out their activity studies. Most of these executed mild antioxidant, antimicrobial, and anti-alzheimer's proficiency however less adopted for anti-diabetic property.

**Keywords:** N-Heterocycles, Antioxidant, Antimicrobial, Anti-alzheimer's, anti-diabetic.



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## Solvent-Free Mechanochemical Synthesis of 2,4-Di Substituted Thiazoles : A Green and Sustainable Procedure

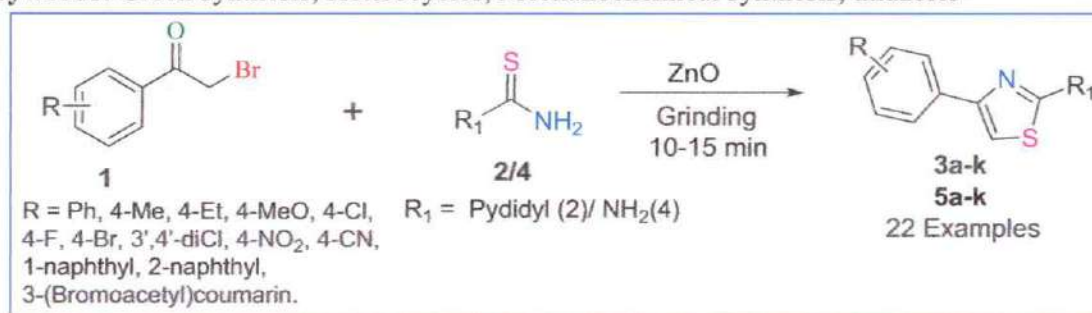
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**Abstract:** Nitrogen and sulphur based heterocycles are important structural motifs in several natural products as well as in synthetic compounds of pharmaceutical interest.<sup>1</sup> Among them, 2-aminothiazole ring systems have attracted great attention from chemists because of their wide variety of applications in both biology and optoelectronics.<sup>2</sup> Because of their broad based utility, several synthetic routes have been reported in the literature.<sup>3</sup> To the best of our knowledge, none has been reported on ZnO catalyzed solvent-free mechanochemical route for the synthesis of 2-pyridyl/amino-4-aryl/naphthyl/coumaryl thiazoles. Therefore, herein we demonstrated a solvent-free mechanochemical method for the synthesis of a series of 2-pyridyl/amino-4-aryl/naphthyl/coumaryl thiazoles (3 & 5) from  $\omega$ -bromoketones (1) and pyridine-3-carbothioamide/thiourea (2 & 4) at room temperature. The present procedure has several advantages which include wide substrate scope, easy to perform, cleaner reaction profile, excellent isolated yields of products in short reaction times (10-15 min) and reusability of catalyst. Further, the method can be scaled up to a gram level and the products do not require any chromatographic purification.

**Keywords:** Green synthesis, Heterocycles, Mechanochemical synthesis, thiazoles



**Scheme 1.** Solvent-free mechanochemical synthesis of 2-pyridyl/amino-4-aryl/naphthyl/coumaryl thiazoles catalyzed by ZnO.

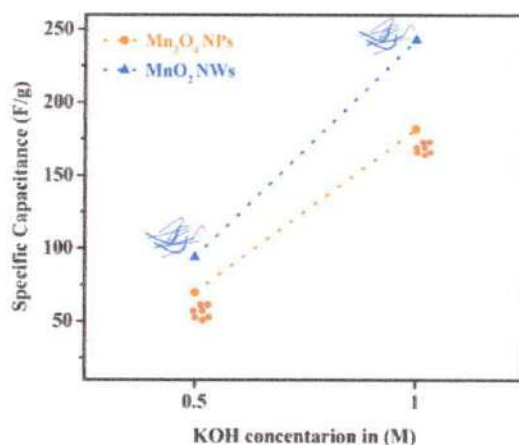
## Manganese Oxide Phase and Morphology Effect on Electrochemical Performance

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*Advanced Materials Research Lab, Department of Materials Science and Nanotechnology, Yogi Vemana University, Kadapa, Andhra Pradesh, INDIA-516005.*

**Abstract:** The monometallic oxides such as  $Mn_3O_4$  nanoparticles (NPs) and  $MnO_2$  nanowires (NWs) were successfully synthesized by a facile simple hydrothermal method at low processing temperature and less time. The prepared materials have same crystal structure with different phase and morphology. These were characterized by X-ray power diffraction (XRD), Fourier transformed infrared spectroscopy (FT-IR), Scanning electron microscopy (SEM) and Transmission electron microscopy (TEM). The electrochemical performance of prepared materials characterized by cyclic voltammetry (CV), galvanostatic charge discharge (GCD) and electrochemical impedance spectroscopy (EIS). The specific capacitance ( $C_s$ ) performance of the  $Mn_3O_4$  and  $MnO_2$  exhibited about 182 and 243 F/g at 0.5 A/g current density in the 1 M KOH compared with 0.5 M KOH electrolyte solution. From these results a wire like morphology have better  $C_s$  than a particle shape morphology in 1 M KOH electrolyte solution.

**Keywords:** Hydrothermal method,  $MnO_2$  NWs, Nickel foam, Supercapacitor.



## Investigation on the Structural and Morphological Properties of Different TiO<sub>2</sub> Nanostructures on the Performance of Dye Sensitized Solar Cells.

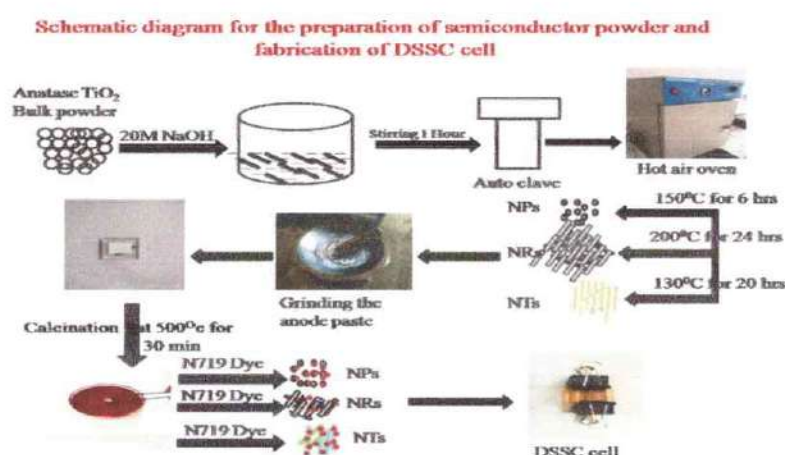
A. Sai Kumar, B. Vijaya Kumar Naidu\*

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**Abstract:** The TiO<sub>2</sub> nanostructures such as nanotubes (TNTs), nanoparticles (TNPs) and nanorods (TNRs) were synthesized by a simple hydrothermal method. These different TiO<sub>2</sub> nanostructures were used to make photoanode film for dye sensitized solar cell (DSSCs). The synthesized nanostructures crystalline nature was evaluated by X-ray diffraction, the surface and internal morphology of the samples were observed by scanning electron microscopy (SEM), field emission scanning electron microscopy and transmission electron microscopy (TEM). DSSCs were fabricated by using the prepared nanostructures as photoanode on FTO glass, N719 dye as light absorber and Idolyte as an electrolyte. The impact of each nanostructure on the overall performance of DSSC was studied by measuring photocurrent voltage (I-V) characteristics and electro chemical impedance spectroscopic (EIS). Among all the nanostructures, TNTs based DSSC shown the highest power conversion efficiency of 5.03% with short circuit current density of 10.2 mA/Cm<sup>2</sup>.

**Keywords:** Dye sensitized solar cells, TiO<sub>2</sub> nanostructures, Photoanode, Power conversion efficiency



## Graphitic Carbon-TiO<sub>2</sub> Nanocomposite; An Efficient Photocatalyst for Dye Degradation and Enhanced Hydrogen Evolution

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*Nanocatalysis and Solar Fuels Research Laboratory, Department of Materials Science & Nanotechnology, Yogi Vemana University, Kadapa – 516 005, Andhra Pradesh, India.*

**Abstract:** In this study, Graphitized TiO<sub>2</sub> composites were prepared by hydrothermal process. This was achieved by decorating graphitic carbon with commercially available TiO<sub>2</sub> by hydrothermal synthesis. The presence of graphitic carbon in composite was confirmed by X-ray diffraction (XRD), Raman, FTIR, and TEM analysis. The photocatalytic performance of the Graphitic carbon –TiO<sub>2</sub> composites was evaluated for the photo-degradation of methyl orange dye. It was found that the ratio of Graphitic Carbon to TiO<sub>2</sub> in the composites significantly affects the photocatalytic activity. Higher amounts of graphitic carbon in the composites showed lower photocatalytic activity than pure TiO<sub>2</sub>. The composite with 1 wt. % of graphitic carbon showed the highest photocatalytic activity, with a 3-fold enhancement in photocatalytic efficiency over pure TiO<sub>2</sub>. It is expected that the synthesis of “high surface area- less particle size” TiO<sub>2</sub> and simultaneous conversion of glucose to graphitic carbon “without using strong reducing agents” could be a promising strategy for preparing other types of carbon based TiO<sub>2</sub> nanotube composite photocatalysts as well.

**Key words:** Graphitic carbon, TiO<sub>2</sub>, Hydrothermal Synthesis, Graphitic Carbon-TiO<sub>2</sub> photocatalyst.

## Optimal Dye Sensitized Solar Cell Performance with Superior Electrocatalytic Active Single Wall Carbon Nanohorn Assisted Conductive Carbon Counter Electrode

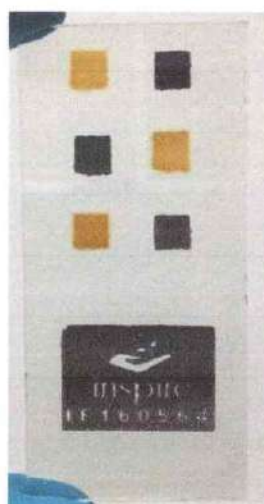
M. Gurulakshmi, A. Meenakshamma, K. Susmitha, **M. Raghavender**\*

Department of Physics, Yogi Vemana University, Kadapa-516 005, A.P., India

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**Abstract:** Dye-sensitized solar cell (DSSC) offers potential advantages includes cost effective materials, economic fabrication, suitable for diffused light conversion, etc. The present work demonstrates the solar photovoltaic performance with single wall carbon nanohorns assisted conductive carbon counter electrode (*SWCNH-CE*) dye sensitized solar cell witnessed power conversion efficiency (PCE) 11.11 %, is higher than platinum (10.63 %), pristine single wall carbon nanohorn (7.74 %) and conductive carbon (9.08%) CE based DSSCs. The achieved results owing to *SWCNH-CE*'s higher conductive nature, excellent electrochemical activities, champion current density ( $J_{SC}$ ) value. The work encouraged to fabricate the DSSC module, and is integrated with supercapacitor (SC), results are presented.

**Keywords:** Solar Cells, DSSC, supercapacitor, carbon nanohorns.



## Tamarind Gum based Stimuli Responsive Hydrogels/Silver Nanocomposites for Controlled Drug Release and Antimicrobial Applications

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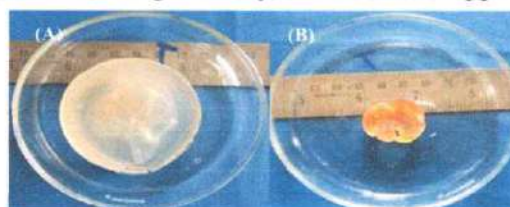
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**Abstract:** Hydrogels are three dimensional polymer networks, which possess of superior physico-chemical properties due to the presence of multi functionalities. Tamarind gum, a carbohydrate polymer has shown great potential in food, agriculture, pharmaceutical, tissue engineering and drug delivery applications. The present study deals with the development of novel biodegradable polymer based silver nanocomposite hydrogels (TGNIE) [Figure 1 & Scheme 1] fabricated with tamarind gum, acrylamide, N-isopropyl acrylamide and ethylene glycol vinyl ether by a simple free radical polymerization using potassium per sulphate as an initiator and bis(2-(methacryloyloxy)ethylphosphate as a crosslinker. TGNIE silver nanocomposite hydrogels were developed by green synthesis method using of *Echinops echinatus* leaf extract as reducing agent. The formation of Ag-NPs in TGNIE hydrogels was confirmed by UV-Vis spectra. Fabricated hydrogel networks and silver nanocomposites were characterized by FTIR, DSC, TGA, XRD SEM, EDX, TEM and DLS. The hydrogel networks are successfully utilized for 5-fluorouracil loading and encapsulation efficiency. The pristine hydrogels were evaluated for swelling, deswelling and different polymer network parameters in double distilled water. The *in vitro* drug release studies were performed both pH 1.2 & 7.4 and various temperatures at 25 & 37 °C. The release time of drug from the hydrogels is extended up to 48 h. Evaluation of antibacterial activity TGNIE silver nanocomposites performed various MDR resistant bacteria's such *Escherichia coli*, *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *Klebsiella pneumonia*.

**Keywords:** Tamarind gum, Hydrogels, Cancer, Silver, Drug delivery, Antibacterial applications.

**Figure 1:** Photographic images of TANEH hydrogels (A) Swollen hydrogel (B) Dried hydrogel.





## Controlled Synthesis of Core/Shell Structured Materials for Superior Photocatalytic Hydrogen Production

V. Navakoteswara Rao<sup>1</sup>, P. Ravi<sup>2</sup>, M. Sathish<sup>2</sup>, M.V. Shankar<sup>1\*</sup>

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**Abstract:** Materials chemistry plays vital role in design and development of highly efficient photocatalysts. In the process of tuning photocatalytic properties such as separation efficiency of photo-excitons and its surface-interface reactions, nanocomposite based photocatalyst with core-shell morphology showed immense benefits for hydrogen production. In our recent publication, it was elaborated the influence of shell thickness both on opto-electrical and catalytic properties [1]. The present study attempted to synthesize hierarchal nanocomposite through facile chemical route. The materials characterization results confirm that presence of CuS/NiO with core/shell morphology. In addition, valence state of optimized photocatalysts exists copper +2, sulfur -2, nickel +2 and oxygen -2 respectively highly influenced on photocatalytic properties. The photocatalytic activity carried out in aqueous solution in the presence of sacrificial agent displayed enhanced photocatalytic performance of 13.4 folds higher than pristine photocatalyst and confirmed stability for five cycles (6 h per cycle). The reasons for enhanced photocatalytic activity is confirmed with photoluminescence spectra that shows separation of photo-excitons in core/shell than pristine, the peak intensity of core/shell displayed 3.6 fold greater than pristine CuS photocatalyst.

**Keywords:** Core/Shell, CuS, photocatalyst, Materials chemistry.

**Acknowledgement:** Authors thankful to Ministry of Renewable Energy, New-Delhi for financial support. V. Navakoteswara Rao gratefully acknowledges Council of Scientific Industrial Research (CSIR-SRF), New Delhi, India for financial support through fellowship (ACK 124480/12K18) to carryout Ph.D.

**References:**[1]. V. Navakoteswara Rao, N. Lakshmana Reddy, M. Mamatha Kumari, P. Ravi, M. Sathish, K.M. Kuruvilla, V. Preethi, K. R. Reddy, N. P. Shetti, Tejraj M. Aminabhavi, M.V. Shankar, Photocatalytic recovery of H<sub>2</sub> from H<sub>2</sub>S containing wastewater: Surface and interface control of photo-excitons in Cu<sub>2</sub>S@TiO<sub>2</sub> core-shell nanostructures, Applied Catalysis B: Environmental 254 (2019) 174-185.



# Nobel Prize in Chemistry

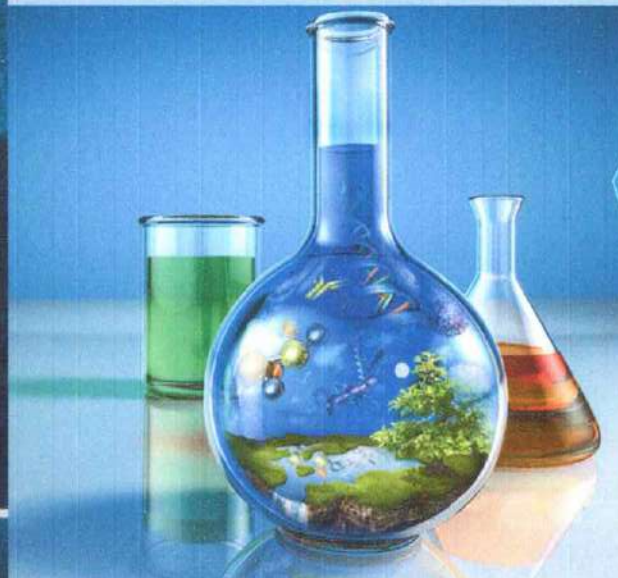


John B. Goodenough (USA, left), M. Stanley Whittingham (UK, centre), and Akira Yoshino (JPN, right) share the Nobel Prize for the development of lithium-ion batteries



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# SERVICES MARKETING

— IN EMERGING —

# GLOBAL ECONOMY



DR. S. DURGA RAO

## A STUDY OF PERCEIVED PRIVACY AND PERCEIVED SECURITY IN ONLINE STORES

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### Abstract:

Individuals mostly hesitate to use services offered via Internet due to their suspicions regarding the level of offered (1) protection of their privacy and (2) security of performing online transactions. Privacy is mostly concerned with the identifiable user data and users' rights to have control over their data. On the other hand, security provides the physical, logical, and procedural safeguards that are needed to keep the data private. In the present scenario more companies are offering their products/services over the web, as the number of internet users is growing rapidly and online technologies are improving. Quality of the website, trust, privacy concerns, security concerns are strong reputation efforts in online stores. The internet offers a wide range of benefits for customers but major two critical problems faced by online customers in India. I.e. privacy and security. Privacy is the control over the one's personal data. Security is the attempted access to data by unauthorized users. This paper main objective is to know the perceived privacy and perceived security of online customers in Tirupati.

Privacy cannot be achieved without obtaining security practice. Despite being closely linked in practice, privacy and security are perceived as separate issues by online users, so in this article the relationship between various perceived privacy and perceived security factors are analyzed.

**Keywords:**perceived privacy, online stores, online shoppers and perceived security.

# SERVICES MARKETING

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GLOBAL ECONOMY

Service industry is facing cut-throat competition because of globalization deregulation and privatization. This edited book presents 78 articles on financial services, healthcare services, personnel services, telecommunication services, tourism services etc. and these articles provide appropriate strategies to improve and meet the challenges by the service industry. Researchers also revealed the emerging trends in services marketing and the common issues of services. Academicians and researchers presented their current and on-going studies in this book and practitioners took the opportunity to share their experiences in this forum. These articles in different areas will provide in depth knowledge to students, research scholars, academicians and practitioners who are interested in services marketing.



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He published 3 books and over 60 articles in National and International journals. Under his supervision 14 candidates have been awarded their Ph.D. degree and 8 more are pursuing.

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# Strategies for Inclusive Growth and Sustainable Economic Development

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## Industry 4.0 - Fuzzy Road Ahead or Opportunities Galore for Human Resources

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### Abstract

Industry 4.0 (fourth industrial revolution) is an automation and data exchange in industrial technologies, i.e. cyber physical systems, the Internet, cloud computing. An organization would require a successful Smart HR strategy to cope up with the challenges of fourth industrial revolution renovation. Emergent technologies such as Internet-of-Things, Big Data, and artificial intelligence will automate most of the HR processes, resulting in efficient Human Resource. Company strategy should be transferred into day-to-day work and should lead to an employee growth plan for every employee. This paper mainly is focused on fourth industrial revolution and its impact on Human Resources. It is found that implementing new technology to increase its efficiency is natural and no one can stop; the employees essentially should acquire specific skills as per the changing requirements to get the jobs and it is estimated that the robots are not for terminating the employee's jobs but for just doing the repetitive work.

**Key Words:** Industry 4.0, Revitalize, cyber-physical systems, Automation

### Introduction

Technology has been developing at an incremental pace since long and leaving no clues of slowing down ever for the human wants and their demand for sophistication too has been showing a ceaseless growth. The anticipated but unimaginable technological disruptions is not an ending list, some go as - the Google's brain child "the quantum computer's incredible data processing speed, driverless cars and ear buds translating foreign languages. Scientists are developing living solar panels that can be printed on paper, and tech pioneers are setting their sights on even grander goals like enhancing the human brain with implants for possibility of telepathic communication. The advent of new digital industrial technology is yet another priceless advancement leading to faster, flexible, efficient and high quality production at economic prices just by gathering and analyzing the data across the machines. Combination of cyber-physical systems, the Internet of Things and the Internet of Systems make Industry 4.0 possible and the smart factory a reality. As a result of the support of smart machines that keep getting smarter as they get access to more data, our factories will become more efficient and productive and less wasteful. Ultimately, it's the network of these machines that are digitally connected with one another and create and share information that results in the true power of Industry 4.0.

Fourth Industrial revolution has a lot to promise when it comes to revenues, investment, and technological advancements, but employment still remains one of the most mysterious aspects of the new industrial revolution. It's even harder to quantify or estimate the potential employment rates. What kind of new jobs will it introduce? What does a Smart Factory worker needs to have to be able to compete in an ever changing environment such as this? Will such changes lay off many workers? These are the questions to be answered in the technological disruptions.

### Literature Review

The Fourth Industrial Revolution is popularly known as Industry 4.0. The first industrial revolution was triggered by water and steam power to move from human labour to mechanical manufacturing. The second industrial revolution built on electric power to create mass production. The third used electronics and information technology to automate manufacturing. The fourth is the current trend of automation and data exchange in manufacturing technologies. Big data and analytics, Autonomous Robots, simulation, Horizontal and vertical system integration, Industrial Internet of things, Cyber security, Cloud computing, Additive manufacturing, and augmented reality are said as the building blocks of industry 4.0.

Industry 4.0 is almost inescapable to think how it'll impact our professional worlds. (HR, VarunBhaskar, HC Leader Services,2017). Managerial leaders and HR executives have faith that

## ABOUT THE BOOK

Indian economy is growing nearer to double digit and its contribution to global economic growth is increasing over the years. Many Indian firms are successfully competing with international firms and also producing substitute products to imports. But, the big question is how inclusive and sustainable is India's growth? To move further and become global power, India needs to work towards inclusive growth and sustainable economic development which is possible through Innovation. Innovation in business models; sustainable and equitable agricultural through mechanisation and finding new models of financial support to farmers; encourage youth to start-up new ventures with innovative ideas; train youth with the skills required for industry to grab the opportunity; take measures to increase financial inclusion; provide necessary infrastructure for the use of information and communication technology in business and reform higher education system to provide quality and sustainable education. Focusing on the above issues would help lead India making her mark as the fastest growing economy with the concern of inclusive growth and sustainable economic development. The book is the compendium of selected papers presented in the conference. The papers are useful and contain valuable inputs for researchers, executives, and policy makers.

## EDITOR'S PROFILE



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183

192

Gulzar Ahmad Nayik  
Amir Gull *Editors*

# Antioxidants in Vegetables and Nuts - Properties and Health Benefits

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## Contents

### Part I Vegetables

<b>1</b>	<b>Pea</b> .....	<b>3</b>
	Jasmeet Kour, Gulzar Ahmad Nayik, Raees ul Haq, Naveen Anand, Mohammed Shafiq Alam, Breetha Ramaiyan, Renu Sharma, Newsheen Nazir, and Swapan Banerjee	
<b>2</b>	<b>Lotus (<i>Nelumbo nucifera Gaertn</i>)</b> .....	<b>19</b>
	Anu Pandita and Deepu Pandita	
<b>3</b>	<b>Beetroot</b> .....	<b>45</b>
	Deepu Pandita, Anu Pandita, Ramachandra Reddy Pamuru, and Gulzar Ahmad Nayik	
<b>4</b>	<b>Lemongrass</b> .....	<b>75</b>
	Jyoti Gaba, Garima Bhardwaj, and Ajay Sharma	
<b>5</b>	<b>Pumpkin</b> .....	<b>105</b>
	Imen Tlili, Hela Chikh Rouhou, Riadh Ilahy, Emna Jedidi, Rym Bouhleb, Leila Romdhane, Samir Ghannem, Marcello Salvatore Lenucci, Mohammed Wasim Siddiqui, Thouraya R'him, and Chafik Hdider	
<b>6</b>	<b>Tinda (<i>Praecitrullus fistulosus</i>)</b> .....	<b>127</b>
	Renu Sharma, Jasmeet Kour, Gulzar Ahmad Nayik, Mohammed Shafiq Alam, and Naveen Anand	
<b>7</b>	<b>Turnip</b> .....	<b>143</b>
	Mohd Aaqib Sheikh, Nadira Anjum, Amir Gull, and Charanjiv Singh Saini	
<b>8</b>	<b>Spinach (<i>Spinacia oleracea L.</i>)</b> .....	<b>159</b>
	Breetha Ramaiyan, Jasmeet Kour, Gulzar Ahmad Nayik, Naveen Anand, and Mohammed Shafiq Alam	

## Regional Disparities in the Development of Irrigation in Andhra Pradesh

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Research Scholar, Department of Economics, Y.V.University, Kadapa

Assistant Professor, Department of Economics, Y.V.University, Kadapa

### Abstract

*Andhra Pradesh (AP) is one of the largest states in India with agriculture as the major source of income for about 60 % of its population depends on agriculture and related activities. AP is comprises into three distinct regions namely, Coastal Andhra, Rayalaseema and Telangana. The Gross Domestic Product (GDP) of Rayalaseema region at 1999-2000 prices was lower, (21.7%) compared to Costal Andhra (43.3%) and Telangana (35.1%) regions. During 2007-08, contribution of the Rayalaseema region to the Sate Gross Domestic Product (SGDP,) at constant prices, of 1999-2000 was only 16 % while other two regions contributed more than 40 % in the same year. Moreover, Gross District Domestic Product (GDDP) contribution is also low in Rayalaseema, indicating the relative backwardness of this region. The paper has examined the prevailing regional disparities of AP in terms of availability of irrigation facilities in the three regions. The paper has also made an attempt to analyse the impact of Mahatama Gandhi National Rual Employment Guarentee Act (MGNREGA) on irrigation faciltieis as this programme entails water resource management works. The study finds low Irrigation Intensity (II) in Rayalaseema region when compared to the other two regions, While it has recorded substantial increase in Telangana region (17.2% in 1955-56 to 45 % in 2012-13) during the last 57 years period, it has only increased 11.4 % in Rayalaseema during this period. The assured irrigation through canal dominates the Coastal Andhra but it is very low in Rayalaseema. On the whole, while area under total wells has increased in Telangana, it has decreased in Rayalaseema. The later has less irrigated area compared to the other two regions. This might be one of the reasons why districts of Rayalaseema are left out of growth process and not able to catch up with other two regions. MGNREGA would have a remarkable impact on rural water management through promotion of irrigation and thus can play a significant role in providing water security in these backward areas.*

### Section I: Introduction

This paper deals with access to the irrigation facilities available for cultivation across the three regions of Andhra Pradesh (AP). It examines the regional disparities and differential access to irrigation in Coastal Andhra, Rayalaseema and Telangana regions. Rayalaseema comprises four districts i.e. Kurnool, Kadapa, Anantapur and Chittoor. Among these four districts, Anantapur

# SUSTAINABLE AGRICULTURE IN INDIA

*Editors*

**Dr. T. Sudarsana Reddy**

**Mr.K.Saketh Reddy**



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## Contents

Foreword

v

Acknowledgements

vii

Sl.No.	Title of the Paper	Page No.
1.	<b>Marketing of Pulses in Pre-Telangana Andhra Pradesh: Opportunities and Constraints</b> <i>- M.Srinivasa Reddy</i>	1
2.	<b>Profitability of Cotton Cultivation (A Study on Kurnool District)</b> <i>- Karnati Saketh Reddy</i>	13
3.	<b>Stakeholders Linkage for Agricultural Development in India- A Case Study</b> <i>- Dr.K.Rajagopala Reddy</i>	24
4.	<b>Dry-Land Agriculture and Watershed Development in Andhra Pradesh</b> <i>- T. Sudarsana Reddy</i>	31
5.	<b>A Study on Growth and Instability of Cotton Cultivation in Kurnool District of Andhra Pradesh</b> <i>- Dr. K. Visweswara Reddy, Dr. E. Lokanadha Reddy</i>	41
6.	<b>A Study on Growth and Instability of Oil Seed Crops in Rayalaseema Region</b> <i>- Dr. T. Govardhana, Prof. K. Satyanarayana Reddy</i>	54
7.	<b>Agrarian Crisis Require Responsive Nation</b> <i>- Dr. M.Ramakrishna</i>	64
8.	<b>Study on Minimum Support Price for Paddy in India during the Post-Reform Period</b> <i>- K.Sekhara, Prof.M.Devarajulu</i>	72
9.	<b>Watershed Approach to Rainfed Agriculture: A Study of Anantapuram District of Andhra Pradesh</b> <i>- Dr.G. Parvathi</i>	82
10.	<b>Agriculture Development in Andhra Pradesh</b> <i>- Dr. P. Prameela Margaret</i>	88
11.	<b>Globalization and Indian Agriculture</b> <i>- Dr.S.Venkata Subba Reddy</i>	103
12.	<b>Sustainable Agriculture in India: It's Role and Prospects</b> <i>- Dr.V. Ramabrahmam</i>	110

Sl.No.	Title of the Paper	Page No.
13.	<b>Agro-Climatic Situations, Strategies and Measures for Weather Related Contingencies in West Godavari District of Andhra Pradesh</b> <i>- Dr. E.Lokanadha Reddy, Premchand Kaila</i>	115
14.	<b>Impact of Globalization on Indian Agricultural Sector</b> <i>- Dr. K. Krishna Reddy</i>	122
15.	<b>Organic Farming in India: A Review of Status, Trends, and Prospects</b> <i>- Dr.E. Lokanadha Reddy, R. Hemanth Babu, Dr.N. Giri Babu</i>	130
16.	<b>Agricultural Marketing</b> <i>- Dr.A.Vijay Gopal</i>	138
17.	<b>A Study on Possible Areas of Agripreneurial Development</b> <i>- Dr.G. Vijaya Bharathi, Mr.P.Sudhakar</i>	142
18.	<b>An Analysis of Technological Development of Groundnut in Rayalaseema</b> <i>- Dr.V. Mary Madhuri, Dr. K.Satyanarayana Reddy</i>	147
19.	<b>Regional Disparities in the Development of Irrigation in Andhra Pradesh</b> <i>- P. Kalandar, Dr. T. Sudarsana Reddy</i>	158
20.	<b>Land-use Pattern and Sources of Irrigation in Tribal Areas of Andhra Pradesh and Telangana State at Sub Regional Level</b> <i>- Ch. Krishna Rao</i>	166
21.	<b>Mechanisation Impact on Paddy Production</b> <i>- Prof. N.R. Venkataramana Reddy</i>	172
22.	<b>Trends in Agriculture Production and Productivity in Andhra Pradesh</b> <i>- Dr. K. Venkata Reddy, E. Raghunatha Reddy</i>	180
23.	<b>Strengthening Indian Agriculture Through Marketing of Agricultural Inputs and Products</b> <i>- Dr. E.Lokanadha Reddy, G. Rakesh Naidu</i>	188
24.	<b>Impact of Government Programmes on Women Empowerment</b> <i>- V. Suneetha, Prof.M.V. Ramanamma</i>	204
25.	<b>"Trends in Cropping Pattern in SPS Nellore District", Andhrapradesh</b> <i>- Bhumana Srisaila</i>	215
26.	<b>Output Responses of Chilies Crop in Andhra Pradesh</b> <i>- Dr.M.Usha Rani</i>	224
27.	<b>Minimum Support Prices in Indian Farmers: A Study</b> <i>- P. Munikrishnaiah, Dr. M. Rama Mohan, Prof. M. Devarajulu</i>	235

Sl.No.	Title of the Paper	Page No.
28.	<b>The Present Organic Agricultural Performs in Andhra Pradesh</b> <i>- Dr. G. Prathap, Dr. V. Ramesh Babu, T. Indumathi</i>	243
29.	<b>Crop Productivity and Training Needs of Beneficiary Farmers in Watershed Development Programme in Rayalaseema Region of Andhra Pradesh</b> <i>- Dr.D.Sreenivasa Rao</i>	253
30.	<b>Response of Groundnut Varieties to Varying Conditions of Drought Areas: A Study of Ananthapuramu District in Andhra Pradesh</b> <i>- Dr.G. Ramalingappa, G. Chandrashekhar, Prof.G. Venkata Naidu</i>	260
31.	<b>Impact of Regional Rural Banks on Economic Conditions of Small and Marginal Farmers in Andhra Pradesh: An Empirical Study</b> <i>- Dr. Seelam Ravi</i>	265
32.	<b>Prospects of Agriculture Insurance in India</b> <i>- Prof.N.R.Venkataramana Reddy, B. Sadhana</i>	276
33.	<b>Sources of Agricultural Finance in India: An Outline</b> <i>- Dr.Shaik Mahaboob Basha</i>	288
34.	<b>Social Inclusion through Mahatma Gandhi National Rural Employment Guarantee Act in Andhra Pradesh</b> <i>- Dr.S.Nageswara Rao</i>	302
35.	<b>Climate Changes and its Impact on Agriculture in Rayalaseema Region of Andhra Pradesh</b> <i>-Dr. S.S.Mahalakshmi</i>	307
36.	<b>Role of Crop Insurance in Climate Change Mitigation and Adaptation A Case of Kadapa YSR District of Andhra Pradesh</b> <i>-Dr. Anitha Manné, B. Nagendra Prasad</i>	313



## A Study on Growth and Instability of Oil Seed Crops in Rayalaseema Region

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<sup>1,2</sup>Department of Economics, Yogi Vemana University, Kadapa, India.

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### Abstract

*The present study examines the trends in area, production and yield of oil seed crops, namely, groundnut and sunflower. The present study confined to Rayalaseema region of A.P. only. Rayalaseema region formed with four districts namely Anantapur, Chittoor, Kadapa and Kurnool. We consider the aggregate data for our study. To study the trends of the selected crops we estimate linear functions for area, production and yield. Crop diversification gives good yields along with crop rotation in this Rayalaseema region. There is a need to provide water facility for huge productivity of groundnut and sunflower and other oil seed crops. The farmers should be a warped and provided new methods of agriculture for oil seed crops to full the targets of productivity.*

**Key words:** Oil seed crops, Crops Diversification, Rayalaseema.

### Introduction

Agriculture as a primary industry plays a significant role in the process of the economic development of a country. In the early stages agriculture is the major contributor to national income and it provides employment to a majority of people. At later stages of a fairly high level of economic progress, the importance of agriculture gradually declines. About 65 to 70 percent of our people depend on agriculture for their live hood. In the name of New Economic Reforms (1991) a structural change took place at the national as well as state level. However, during the post-economic reform period the issues were to raise the productivity, increase the cultivable area of pulses and oil seed crops, effective utilization of irrigation facility and development of rural market for the improvement of the agriculture to achieve agriculture a growth of not less than 4 per cent. Now it is around 2 per cent and is declining. The output index of all crops increased at 3.4 per cent per year in the 1980s as well as in the early 1990s. The growth rate of GDP from agriculture declined from 4.2 per cent in the 1980s to 3.7 percent per annum in the 1991s.

### Review of Literature

Naidu et al., (1994)<sup>1</sup> points out the trends in area, production and productivity of major crops in Andhra Pradesh. They found that the time series analysis from 1980-81 to 1989-90

## Agriculture Development in Andhrapradesh

Dr. P. Prameela Margaret

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Agriculture is the life line of the economy of Andhrapradesh. Andhra Pradesh mirrors India in the agriculture sector. It has all the types of soil obtaining elsewhere in the country. It has all the crops being cultivated in the rest of the country. Contributing over third of states GSDP and provides lively hood to about 70% of the population. In order to achieve property wellbeing and high quality of life for the people. The vision of Andhra Pradesh the first state in the country to develop it is a build prosperous democratic, egalitarian and cohesive society. Andhrapradesh with its strength in agriculture and food production has tremendous potential to emerge as a major power house. Agriculture performance is the key economic growth and poverty alleviation so it is the dominant activity in rural areas. The working group on the food and agro industry of the ministers councils or trade and industry calls for move a from green to food revolution through a sustained development in agriculture and larger investment in technology and skills. Andhrapradesh is one of the leading agriculture in the state and the future of its agriculture sector is closed inter-linked with several factors in the policy climate at the state, national and international levels. Agriculture is the main occupation of about 62 per cent of the people in Andhra Pradesh. Rice is a major food crop and staple food of the State contributing about 77 per cent of the food grain production. Other important crops are jowar, bajra, maize, ragi, small millets, pulses, castor, tobacco, cotton and sugarcane. The new Andhra Pradesh government has announced a new farmer support scheme, christened YSR Rythu Bharosa that will be implemented from October 15 in the state, offering investment support of Rs 12,500 per anm.

Andhra Pradesh (AP) is one of the largest states in India, with agriculture providing the major source of income for about 60 per cent of the population even though it contributes only 19 per cent state GDP. In the last 40 years, annual growth rate of agriculture is 2.88 per cent as against targeted growth of about 4 per cent per annum. This paper analyses the sources of crop sub-sector growth in pre-liberalization period (from 1970-1989) and post-liberalization period (from 1990-2009). The growth rate in value of production in pre-liberalization period is lower (2.4% per annum) than post-liberalization period (2.7% per annum) per annum. Even though contribution of both yield and crop diversification to growth in value of production is higher, the negative contribution of real prices is the main reason for slower growth in pre-liberalization period. While positive contribution of prices along with yield and diversification in the post-liberalization period contributed for higher growth rate. In the post-liberalization period, regions are specializing based on their resource endowment (coastal Andhra in paddy, Telangana in

## Watershed Approach to Rainfed Agriculture: A Study of Anantapuram District of Andhra Pradesh

Dr.G. Parvathi

Assistant Professor, Dept of Political Science & Public Administration, Yogi Vemana University, Kadapa

### Abstract

*In the 1980s and 1990s, agricultural scientists and planners aimed to promote rain fed agriculture through watershed programme. Watershed Management programme is a holistic concept which tries to integrate several components like soil and water conservation, forestry development, agriculture, horticulture, livestock development etc. 86.8 per cent of cropped area in Anantapuram District of Andhra Pradesh is rainfed and is prone to frequent monsoon failures leading to drought. In fact the district is the second lowest rainfall district in the nation after Jaisalmer, Rajasthan. Watershed approach is adopted to manage the rainfed or dry land agriculture in the district by implementing various schemes like Joint Forest Management (JFM), National Watershed Development Project for Rainfed Areas (NWDPR), Employment Assurance Scheme (EAS), Andhra Pradesh Rural livelihood Programme (APRLP), Andhra Pradesh Hazard Mitigation Programme (APHM), Desert Development Programme (DDP), Hariyali Programme, and Integrated Watershed Management Programme (IWMP). The present paper attempts to study the Watershed approach to manage the rainfed or dry land agriculture in Anantapuram district, its need, success rate and constraints in implementation.*

**Key Words:** *Watershed Management programme, Rainfed Agriculture, Dry land agriculture, National Watershed Development Project for Rainfed Areas (NWDPR)*

### Introduction

Anantapuram district is one of the four districts of Rayalaseema region and the largest among the 13 districts of Andhra Pradesh with a geographical area of 19,197 sq.km. The district is economically backward and chronically drought affected. The district is classified as desert-prone, by the Government of India. On average once in every 7 years, the district experiences drought conditions. In 2006, Anantapuram was one of the thirty-one districts identified by the Government of India as being prone to agriculture-related suicides. The suicides are reported from the entire district except few mandals viz., Hindupur, Lepakshi and Chilamattur, irrespective of whether the mandal is falling in command area or non command areas, low or high ground water development.

## Sustainable Agriculture in India: It's Role and Prospects

Dr.V. Ramabrahmam

Assistant Professor, Dept. of History & Archaeology, Yogi Vemana University, Kadapa-516 005.

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### Introduction

Agriculture has always been called the backbone of Indian economy, supporting the livelihoods of the majority of the population. Although India has a significant presence internationally in terms of production of key cereals, pulses, fruits, vegetables and animal products, at the same time, productivity is fairly low. Despite a conducive policy environment and strong demand pull for the sector, key challenges plaguing the sector involve smaller holding size, dismal primary and secondary processing infrastructure, a convoluted supply chain with multiple levels and intermediaries, and limited last mile delivery of services, to name a few.

The role of agricultural sector in Indian economy can be seen through its contribution to Gross Domestic Product and employment. The sustainable agriculture development of any country depends upon the judicious mix of their available natural resources. In spite of fast growth in various sectors, agriculture remains the backbone of the Indian economy. Sustainable agriculture is the system of raising crops for greater human utility through utilization of resources with better efficiency without disturbing, misbalancing or polluting the environment.

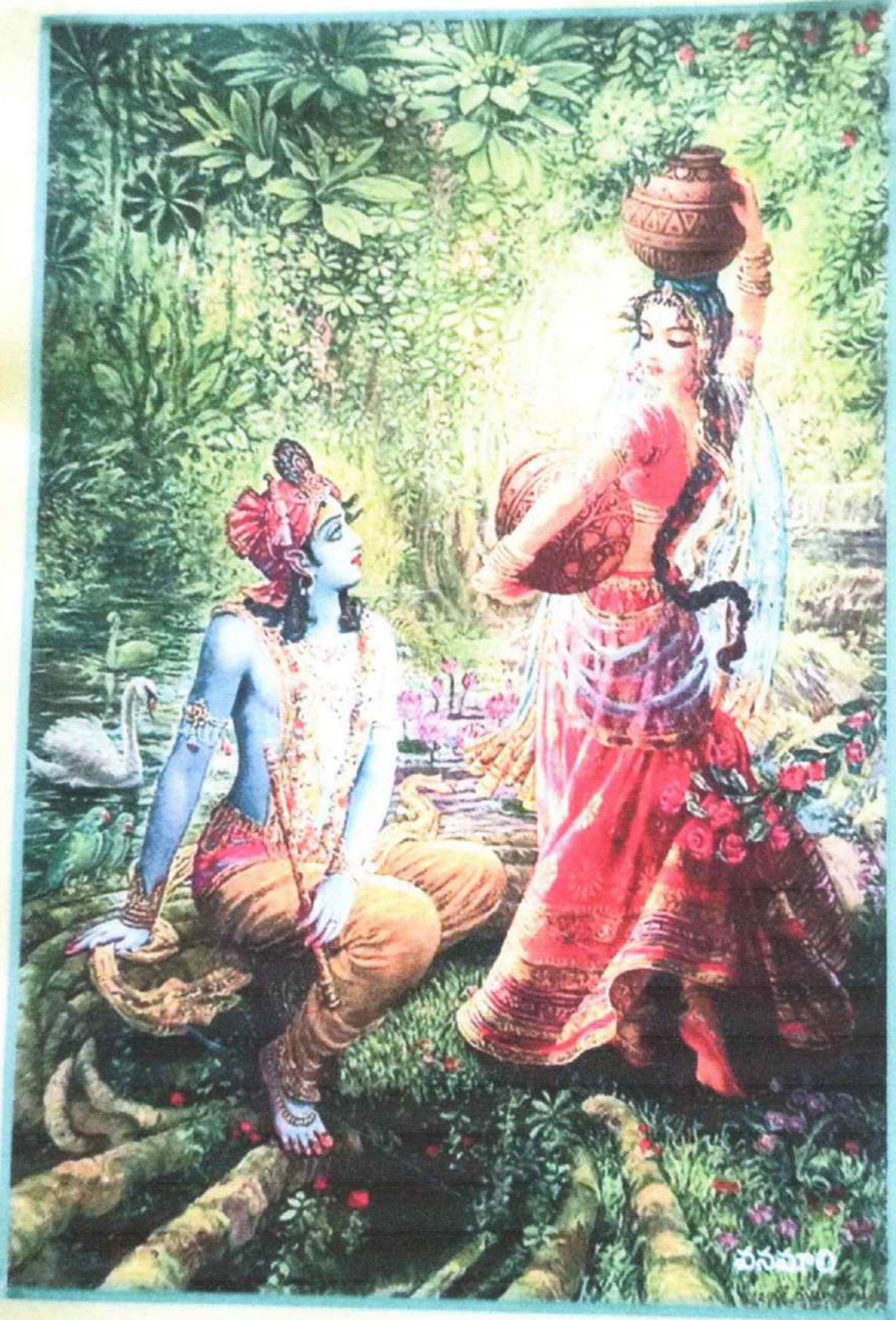
Being the largest private sector 'agriculture' enjoys a very important position in Indian economy. As it is having link from various sectors like production, processing and marketing; agriculture continuously dominate to change in the India. Sustainable development in the agriculture sector aims to increase the productivity, efficiency and level of employment and further aims to protect and preserve the natural resources by the over utilization. It also provides mechanism to reduce the soil degradation through multiple cropping systems and through the deforestation and much other reason.

The Government of India therefore set up a panel on doubling farmers' income by the year 2022. Agricultural reforms such as reducing cost of cultivation, enhancing productivity, improving profitability, encouraging organic farming are in the pipeline. Doubling the farmers' income in a given timeframe is a huge task as Indian agricultural is also beset with several problems such as climate change, soil degradation and lowering of water level at some areas, increasing cost of agricultural inputs and growing numbers of small and marginal farmers with growth of population.

In such a situation where overcoming the ongoing farming problems is also an issue, enhancing agricultural productivity and improving the farmers' income is a double challenge. It cannot be achieved without reaching up to the level of every farmer analyzing how do he/she is doing

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# Globalization and Indian Agriculture

Dr.S.Venkata Subba Reddy

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## Abstract

Globalization refers to integrate the domestic market with world market in the field of trade of goods and services, technology and labour etc. The term globalization has come into common practice since the 1980s, reflecting in the technological advances that have made it easier and quicker to complete international transactions flows, both trade and financial. Globalization means an explanation of market from local level to worldwide. It aims at the integration of the Domestic Economy with the Global Economy and the optimum utilization of growth potential. The process of globalization has revolutionized World Agriculture and allied sectors directed to improve the efficiency productivity and cost competitiveness. Globalization has brought in new opportunities to developing countries. Greater access to developed country markets and technology transfer hold out promise improved productivity and higher living standards. Post liberalization, Indian agriculture sector face new challenges in the form of competition from highly subsidized agriculture of developed countries. This prompts the need for making Indian agriculture successful and profitable by improving the conditions of small and marginal farmers, countering then negative effects of Green Revolution, developing and promoting organic farming, and diversifying cropping pattern from cereals to high value crops. Agriculture sector plays key role in economic development of the country. Agriculture in India is the means of livelihood of more or less two thirds of the work force in the country. It has always been INDIA'S most important and desired economic sector. Therefore, present study analyses the impact of globalization on Indian agriculture.

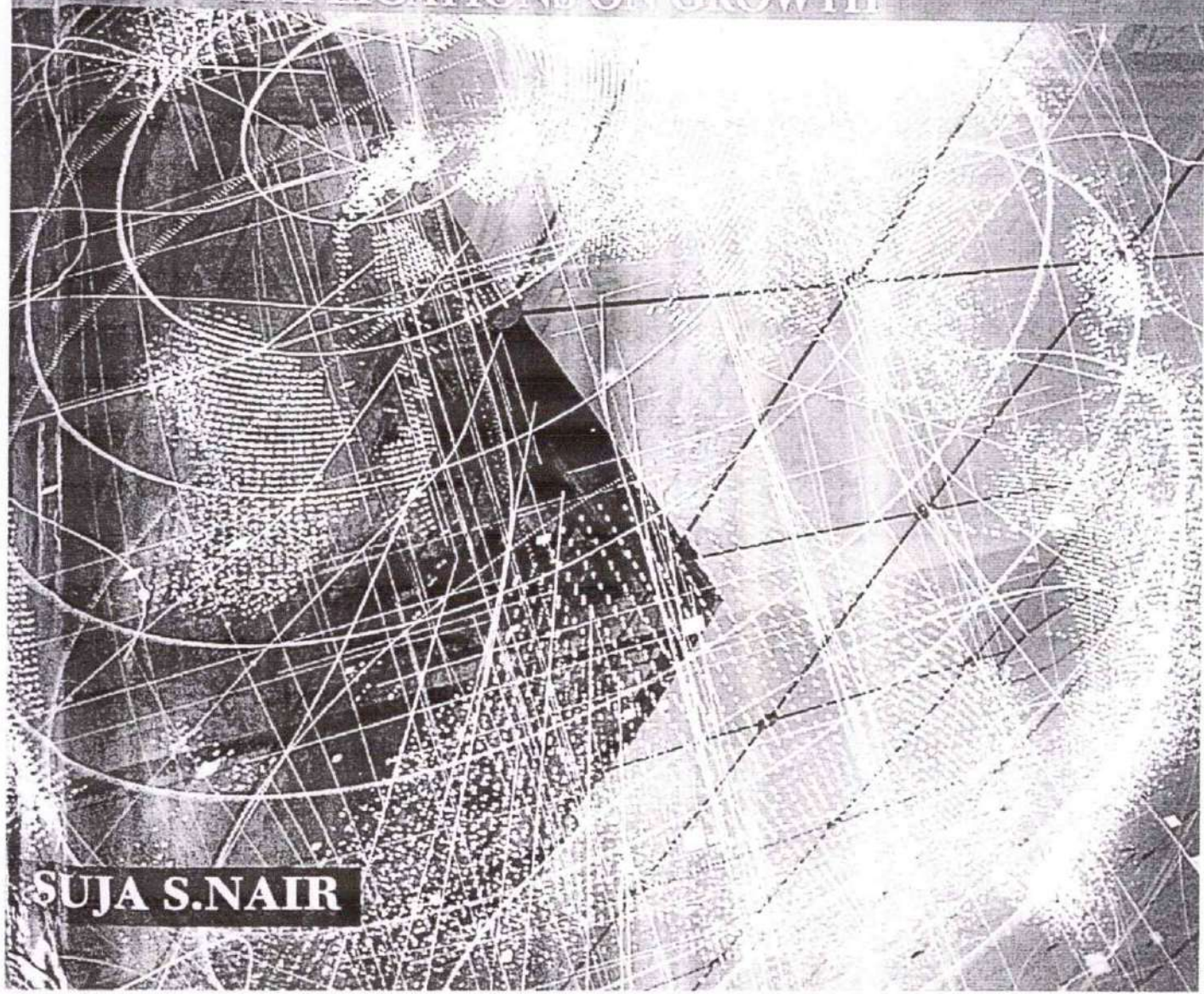
## Introduction

Globalization refers to integrate the domestic market with world market in the field of trade of goods and services, technology and labour etc. The term globalization has come into common practice since the 1980s, reflecting in the technological advances that have made it easier and quicker to complete international transactions flows, both trade and financial. Globalization has opened up new and tremendous opportunities for worldwide developers. Under the influence of the process of globalization, India in 1991 introduced economic policy changes and integrated its economy to the international economy. Globalization in India arrived just before the end of the cold war. India introduced changes in industrial and trade policies to improve its efficiency, productivity and competitiveness of its economy. Globalization means an explanation of market

175  
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# IMPACT OF GLOBALIZATION ON MSME'S

PROSPECTS, CHALLENGES AND POLICY  
IMPLICATIONS ON GROWTH



**SUJA S. NAIR**



**IMPACT OF GLOBALIZATION  
ON MSME'S—  
PROSPECTS, CHALLENGES AND  
POLICY IMPLICATIONS ON GROWTH**

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23. Financial Inclusion Options: Small and Medium Enterprises - <i>Dr. P. Vasavi, Dr. K. Madhavarao</i>	244
24. A Study of Debt Equity Analysis of Reliance Industries Ltd. - <i>Dr. Shvetakulshrestha, Dr. Chetnaparmar</i>	257
25. Impact of Globalisazation on MSMEs—Prospects, Challenges and Policy Implications on National Growth - <i>A. Malyadri, Dr. K. Radhika</i>	264
26. The Impact of Globalization on Challenges Faced by and Opportunities to MSMEs - <i>Ammu Padma</i>	273
27. Impact of Globalization on MSMEs—Prospects, Challenges and Policy Implications on National Growth - <i>P. Naveen Kumar, Burlanaresh</i>	283
28. Financing SME Growth: The Role of NSE & BSE - <i>Dr. Ganginenidhananjhay</i>	301
29. MSME—Awareness of Supportive Measures—The Working of Treds by RBI—CGFS Etc. - <i>G. Rajasekar</i>	308
30. Do Investors Really Regret?—An Analysis of SME IPO - <i>Mrs. A. Sumera, Prof. M. Srinivasa Reddy</i>	317
31. SME Platform in Indian Stock Exchanges—A Boon to MSME Sector - <i>Dr. P. Roopa</i>	327
32. A Study on Mudra Schemes in Credit Growth of Micro, Small and Medium Enterprises Sector in India - <i>Dr. Anitha Manne</i>	337
33. GST—It's Implications on MSME - <i>Dvijethajadda, M. Gayatrianupama</i>	344
34. Scope for New Ventures for Women Entrepreneurship in the Era of Globalisation—A Study Based on Led Bulb Manufacturing Units in Kerala - <i>Dr. Sudheer. S.P, Dr. P. Arunachalam</i>	360
35. Goods and Services Tax: A Booster to Micro Small and Medium Enterprises - <i>Mrs. O.V.A.M. Sridevi, Mr. B. Ratnasekharbabu</i>	372
36. Impact of Globalization on MSMEs - <i>G. Nirmala Jyothi</i>	381

# A Study of Mudra Schemes in Credit Growth of Micro, Small and Medium Enterprises Sector in India

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## ABSTRACT

For long, Small Scale Industries, and in present scenario, the Micro Small Medium Enterprises (MSME) plays a prominent role in the growth of the Indian Economy. This sector performs a direct impact on the growth of the overall economy. Not only plays a significant and complementary role in the industrialisation of the economy but also contributes enormously to the socio-economic development of the country. As per the Fourth All India Census of the Micro, Small and Medium Enterprises, the total number of enterprises of the MSME sector is 361.76 lakh. Out of which 15.64 lakh are registered enterprises while the remaining 346.12 lakh are in the unregistered segment. According to the Ministry of Micro, Small and Medium Enterprises, GOI, the employment in this sector has increased to 80.52 million in 2006-07 from 7.50 million in 1981-82. The data further reveals that, there are 117 million people employed in 51.06 million enterprises across the country. The SME sector in India has been changing over time, mostly through changes in Govt. policies time to time. After Globalisation, the growth in production almost doubled from 8.9 per cent to 16.6 per cent, employment grew by 10.2 per cent, in the case of exports the growth rate slightly increased to 7.64 per cent. During this period, productivity multiplied by almost four times and grew at the rate of 6.45 per cent. This sector contributed 33 per cent of industrial GVA and 31 per cent of Industrial Gross Domestic Product at constant prices base year 2011-12 during the year 2016-17. Since 2014, Govt. of India has introduced various reform measures to boost the overall growth in MSME Sector and launch of MUDRA Scheme is one of the key initiatives among them. This scheme has been initially formed as a wholly owned subsidiary of Small Industries Development Bank of India with 100 per cent capital being contributed by it. At present, the authorized capital of MUDRA is 1000 crores and paid up capital is 750 crore, fully subscribed by

## Role of Crop Insurance in Climate Change Mitigation and Adaptation A Case of Kadapa YSR District of Andhra Pradesh

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### Introduction

Climate change is a global environmental challenge that is threatening sustainable development around the world. It is a continuing long-term process manifesting itself with gradual increase in temperature, greater variability in rainfall, rise in sea level and increased frequency, intensity and duration of extreme weather events, such as drought, flood, cyclone and storm surge (IPCC, 2007). India being located in the low latitude region of South Asia is extremely vulnerable to climate change because of its tropical climate, monsoon rain, long coast line, greater dependence on agriculture, high incidence of poverty, low irrigation coverage and inadequate resources and technology to combat climate change. Agriculture is the dominant sector in Indian economy. Agriculture contributes 22 percent of GDP, provides 58 percent of employment, sustains 69 percent of population, produces all the food and nutritional requirements of the nation, important raw materials for some major industries, and accounts for about 14 percent of exports. However, agricultural production is beset with various risk factors due to occurrence of natural calamities like flood, drought, cyclone and storm surge, infestation of plant diseases and pest attack, technology failure, irregularity in input supply etc. (Mamata Swain, 2014).

In the last fifty years, there have been about 15 major droughts in India, due to which the productivity in those years was adversely affected. Crop failures have spurred suicides by many farmers even in recent the past (Naveen Kalra. P.K. et al). In India agriculture is diversified and prone to a variety of risks. Most of the farmers are small and marginal. In most areas, agriculture is rain fed, leading to a greater degree of yield variability and risk. Crop Insurance, which aims at addressing yield risk-though necessary for a vast majority of farmers-is subject to structural, design and financial problems. Conspicuously, it is a potentially more effective risk-shifting mechanism tool.

**Dandekar(1976)** clearly states that the crop insurance is a vital technique to protect the farmers from crop loss. He suggested introducing individual crop insurance in Indian agriculture.

The area approach crop insurance eliminates the moral hazard problem and reduces effectiveness of adverse selection problem and also the administrative cost. Further, Dandekar

**EXPONENTIAL TRANSITION OF MANAGEMENT  
PRACTICES AND IMPLICATIONS FOR SECTORIAL  
PROSPERITY**

**DR. N. SANTOSH RANGANATH  
&  
PROF. KOPPALA VENUGOPAL**



**EXPONENTIAL TRANSITION OF MANAGEMENT PRACTICES AND IMPLICATIONS FOR SECTORIAL PROSPERITY**

**DR. N. SANTOSH RANGANATH & PROF. KOPPALA VENUGOPAL**

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44	A STUDY ON WORK LIFE BALANCE AMONG NURSES: IN CASE OF Q1 HOSPITALS, VISAKHAPATNAM	304
	K.Prasanna and Dr. Bonam Sivakumar	
45	A STUDY ON STRATEGIES FOR HUMAN RESOURCE MANAGEMENT DURING COVID 19	311
	Mr. P.T.J.K. Lilian and Dr. S.Karthik	
46	POST COVID19 (CORONA VIRUS PANDEMIC): NEW JOB IN RECESSION - A CHALLENGE	314
	Hardeep Singh and Bikram Pal Singh	
47	MANAGEMENT DECISIONS IN THE AGE OF PANDEMIC SITUATIONS: FUTURE OF WORK TRENDS	318
	Sruthi. S	
48	<b>CHANGING ROLE OF HR DURING COVID-19 PANDEMIC</b>	<b>322</b>
	<b>Shaik Abdul Mazed and Dr. P. Saritha</b>	
49	EVOLUTION OF HUMAN RESOURCE DEVELOPMENT: OPPORTUNITIES AND CHALLENGES	331
	Dr. M. Chinasubbarao and Prof.T.Kamaraju	
50	A STUDY ON TRAINING AND DEVELOPMENT WITH REFERENCE TO BHEL – HPVP.LTD, VISAKHAPATNAM	340
	Kothapalli Saikumar and D. Pranaya	
51	A STUDY ON HRM POLICIES AND PRACTICES WITH REFERENCE TO BHARAT HEAVY ELECTRICALS LTD, VISAKHAPATNAM	347
	G.Mounika and Prof. D. Vishnu Murthy	
52	ASSESSMENT ON THE DISCIPLINARY MANAGEMENT ON EMPLOYEE PERFORMANCE IN LOTUS HOSPITALS FOR WOMEN & CHILDREN, VISAKHAPATNAM	355
	K.Sireesha, Hanumathu Udaybhaskar and Dr. B. Balaram	

## CHANGING ROLE OF HR DURING COVID-19 PANDEMIC

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**Abstract:** COVID-19 pandemic has disturbed organizations and made HR personnel to think differently by considering new normal norms like social distancing, new work conditions that they may never have envisioned. To stop the spread of the coronavirus, organizations have changed to a Work from Home Model (WFHM), Remote Connections (RC) at a rate and scale, monitored and controlled by email and video conferencing. Sum and substance, HR Managers role has become more crucial and need to accomplish troublesome work under these unprecedented conditions. HR is worried about employee's wellbeing and prosperity during the pandemic; they are under the strain of handling the deskwork and giving comfort to the large number of laborer's simultaneously. HR has consistently been the front liner for workers and the HR's job in observing and keeping up has gotten significantly. Traditional HR is being supplanted with a comprehensive methodology utilizing trend setting innovations and being human driven too. HR managers are literally doing war with the difficulties of reclassifying their techniques on administration, ability, assorted variety while assessing their operational adequacy. The world stands up to different emergencies and COVID-19 being the greatest one right now which has hit the entire world and its economy. In this scenario, this research paper emphasized on role and challenges of HR during the pandemic.

**Key Words:** COVID-19, Organizations, HR Personnel, Work from Home (WFM), Administration, Remote Connections (RC)

### I. INTRODUCTION

As the Coronavirus receipts done the Worldwide, similarly, can HR bests assistance businesses achieve the disaster. Willpower or to resolve the unintentional tactics of handling professional overlays the method and techniques for convalescing incorporation of humanoid and digital workforces? These remain supreme periods, maddening aeras and unchartered topography for all of us. COVID-19 has engaged the universally by whirlwind and elated out a new typical as to in what way organizations accomplish the professional. Organizations universally remain embarking upon swift issues of possession staffs safe, approving optimum operation of staff, and perpetuation the stamina of professional processes. However, of the case, companies unanimously are going out of their ways and accountability their greatest to approve amalgamated circulations and dependably advance efficacy even throughout these bizarre circumstances.

Today, HR is no lengthier working behind padlocked doors and is a critical part of driving the company's accomplishment. During these unparalleled times, the role of HR leaders converts all the more imperative and they are predictable to respond rapidly and lengthily, bearing in mind proximately, short-term, and long-term implications of this universal calamity. Therefore, there is burden on HR from the standpoint that it takes into interpretation the following:

**Table-1: Role of HR from Standpoint**

The demand-supply disruption, productivity or Profitability challenges
Being able to deal with the new paradigm of recruitment freezes
Bringing onboard new methods and practices for Virtual work zones



Sadhan Kumar Ghosh *Editor*

# Urban Mining and Sustainable Waste Management



<b>Recycling of Polymers from WEEE: Issues, Challenges and Opportunities</b> .....	69
Biswajit Debnath, Ranjana Chowdhury and Sadhan Kumar Ghosh	
<b>Slate Mine Wastewater, the Best Substitute for Cementation</b> .....	81
S. Altaf Hussain, S. M. Subhani and S. V. Satyanarayana	
<b>Waste Coal Utilization in India: A Review</b> .....	91
Krishna Kant Dwivedi, Prabhansu, M. K. Karmakar, A. K. Pramanick and P. K. Chatterjee	
<b>Temporal Changes of Solid Waste at Limestone Quarries in and Around Yerraguntla, YSR District, A.P., using Google Earth Images</b> .....	99
Y. Sudarshan Reddy, B. Suvarna, M. Prasad, V. Sunitha and M. Ramakrishna Reddy	
<b>Waste Is not a Waste—It's Time to Realize</b> .....	111
M. Rao Divi	
<b>Effective Treatment for COD Removal of Landfill Leachate by Electro-coagulation</b> .....	129
P. T. Dhorabe, A. R. Tenpe, V. S. Vairagade, Y. D. Chintanwar, B. R. Gautam and V. R. Agrawal	
<b>Estimation of Greenhouse Gas Emissions from Matuail Landfill Site</b> .....	149
Md. Maruful Hoque and M. Tauhid Ur Rahman	
<b>Stabilization of Contaminated Soil in a Landfill Site with Ground Granulated Blast Furnace Slag</b> .....	161
Ramiz Raja and Supriya Pal	
<b>Air Quality Survey of Some Major Dumpsites in Lagos State, Nigeria</b> .....	169
Omowonuola Olubukola Sonibare, Adeniyi Saheed Aremu, Rafiu Olasunkanmi Yusuf and Jamiu Adetayo Adeniran	
<b>Remediation of bis(2-Ethylhexyl) Phthalate and Phenol, 4,4'-(1-Methylethylidene)bis—in Landfill Leachate Using Biopolymer</b> .....	185
P. Agamuthu, A. Aziz, A. Hassan and S. H. Fauziah	
<b>Biodegradation of Plastic Waste Using Marine Micro-Organisms</b> .....	195
Rwiddhi Sarkhel, Shubhalakshmi Sengupta, Papita Das and Avijit Bhowal	
<b>Current Scenario of Plastic Waste Management in India: Way Forward in Turning Vision to Reality</b> .....	203
Tadinada Sri Sasi Jyothsna and Bandari Chakradhar	

# Temporal Changes of Solid Waste at Limestone Quarries in and Around Yerraguntla, YSR District, A.P., using Google Earth Images



Y. Sudarshan Reddy, B. Suvarna, M. Prasad, V. Sunitha  
and M. Ramakrishna Reddy

**Abstract** In limestone mining and cement industry, solid and liquid wastes are generated in every day and every stage of the operations and are required to mitigate properly. Different types of waste generated from both the industries are cement and limestone quarry. Due to environmental impact and public health and safety, proper efforts must be made to decrease waste generation and hence efficient disposal practices have to be followed. Hence, this study aims at a better understanding of spatial and temporal changes of unplanned dumping sites from 2006 to 2018. Google Earth mapping is one of the most advanced methods for identification of rock-solid waste clearly for collecting on satellite image data. This paper is centered on application of Google Images in assessing the temporal changes of solid waste at limestone quarries in and around Yerraguntla. Time series multi-date Google Earth imageries of 2006–2018 are used to demarcate the evolutionary changes in limestone waste disposal management and to understand the spatial and temporal changes that happened due to the changes by expanding the rock waste dump around Yerraguntla village, YSR district, A.P. Results revealed that the solid waste management in the study area is very poor which need to be properly monitored so as to mitigate the present and future environmental threats.

**Keywords** Temporal changes · Solid waste · Limestone quarries · Google Earth · Yerraguntla

## 1 Introduction

Waste is defined as the discarded and discharged material generated during every stage of life causing adverse health and environmental impact (Bringi 2007). Environmental contamination and waste management are the major concerns to earth scientist and form other related fields of science all over the world both in developing

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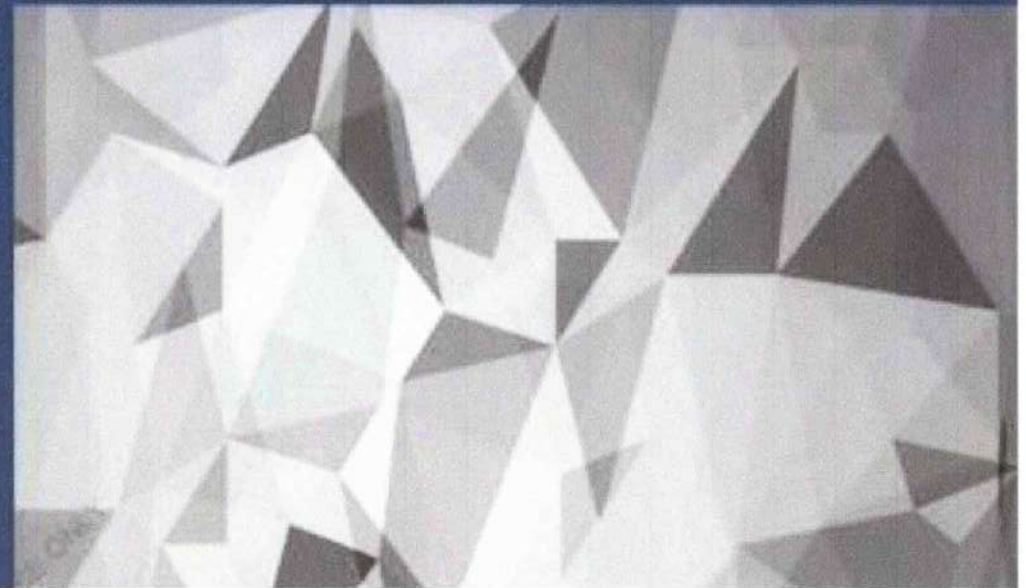
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In this book, an attempt is made to analyze the heat and mass transfer effects on a laminar two-dimensional steady/unsteady convection flow of a viscous incompressible and radiating Newtonian/non-Newtonian fluid past a stretching wedge/stretching sheet/thin liquid film bounded by a porous/non-porous medium, by taking viscous dissipation, uniform/non-uniform heat source/sink, activation energy, and binary chemical reaction, aligned/non-aligned magnetic strength into account. The approximate solutions are obtained by using Runge-Kutta with the shooting method. A parametric study is carried out to illustrate the behavior of the velocity, temperature, concentration, skin-friction, Nusselt number, and Sherwood number for variations in the various thermophysical and hydrodynamical parameters and are represented in figures and tables.

Numerical Studies of MHD



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## Numerical Studies of MHD Convective Fluid Flows in Various Geometries



Suneetha Subbarayudu

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**An Intervention Study**



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**Blurb/Shorttext:**

In this book, an attempt is made to assess the everyday memory performance among older men and women, its relationship with Socio-demographic and Psychological variables, and also to see the efficacy of the intervention on a selected sample of older subjects. Everyday memory refers to memory operations that routinely occur in one's daily environment. The hallmark of everyday memory and associated research, then, is that it involves the performance of tasks that occur naturally in the real world. The review reveals that there is a paucity of studies on everyday memory performance in the Indian aged. The present study focuses on the assessment of everyday memory in the aged (N=600) and its association with Physical health and Psychological health, Depression, and Life review. The main sample includes men and women with the age group of 60-75+. The intervention was carried out on a select sample of older men and women (n=120) with poor everyday memory performance. As the data indicates there are differences among different sub-groups in the performance of everyday memory. The interventions were carried out on a select sample of subjects.

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## Chapter 11

# Genetic Marker Identification for the Detection of Early-Onset Gastric Cancer Through Genome-Wide Association Studies



**Manoj Kumar Gupta, Jinka Rajeswari, Pamuru Ramachandra Reddy,  
Koppula Satish Kumar, K. V. Chamundeswaramma,  
and Ramakrishna Vadde**

**Abstract** The complete human genome sequence published by Celera and Human Genome Project in 2001 has provided us with in-depth knowledge about both location and structure of genes; however, they do not provide any information about the genetic diversity between and within human populations. International associations such as the 1000 genomes project, Simons Genome Diversity Project and International HapMap project employed high-throughput sequencing technologies to explore the genetic diversity among various human population across the world. All these studies suggested that every human endures 250–350 loss-of-function mutations on average as well as they are heterozygous for about 60–120 variants, which are associated with genetic disorders. Information about this genetic diversity among human enable us to carry out genome-wide association studies (GWAS) and recognize genes and its respective variants related with any traits of interest or diseases. Till date, more than 1600 GWAS studies have been reported on ~300 traits and diseases. Gastric cancer is a solid tumor with complex genetic and

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191

## CHAPTER 11

# Identification of targeted molecules in cervical cancer by computational approaches

Manoj Kumar Gupta and Vadde Ramakrishna

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### Abstract

Cervical cancer is the second leading cause of cancer death in adult women. The three most widely employed techniques for the treatment of cervical cancer are radiotherapy, surgery, and hormone chemotherapy. Recently several biomarkers have also been identified using classical and high-throughput technologies. High-throughput technologies generate huge data, which in turn demand development of robust computational approaches for analysis of this big data in a more comprehensive way. This, in turn, will enable us to better understand mechanisms associated with many diseases, including cervical cancer. Considering this, in the present chapter, we present information about different computational approaches that have been employed to detect target molecules associated with cervical cancer. Information obtained revealed that to date limited computational studies have identified several cervical cancer-associated key hub genes (e.g., *BTD*, *PEG3*, *RPLP2*, and *SPON1*), long noncoding RNA (e.g., *GOLGA2P5*, *EMX2OS*, *FLJ10038*, *FAM66C*, *ACVR2B-AS1*, *AMZ2P1*, *LINC00341*, *ZNF876P*, *MIR9-3HG*, and *ILF3-AS1*), and miRNAs (e.g., *Hsa-mir-1273g*, *Hsa-mir-5095*, *Hsa-mir-5096*, and *Hsa-mir-1273f*) that play a key role in cervical cancer development. However, as there are only a few number of computational studies performed on cervical cancer datasets, there is still scope for developing more robust software/algorithms and analyzing cervical cancer datasets. In the near future, the information in this chapter will be highly valuable for cancer biologists and immunologists toward cervical cancer treatment.

**Keywords:** Cervical cancer, Computational approach, Key genes, Drugs.

### Abbreviations

<b>circRNAs</b>	circular RNA
<b>GWAS</b>	genome-wide association study
<b>HPV</b>	human papillomavirus
<b>lncRNAs</b>	long noncoding RNA
<b>miRNA</b>	micro RNA

### 1. Introduction

Cervical cancer is the second leading cause of cancer death in a young adult women. Cervical cancer affects women of different countries distinctly. Incidence of cervical cancer in women of high-income countries is lower than in low- and middle-income countries

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## Chapter 13

# Applications of Computational Biology in Gastrointestinal Malignancies



Manoj Kumar Gupta and Ramakrishna Vadde

**Abstract** Gastrointestinal cancers (GICs) are the most common cancers of the digestive tract system in humans. Earlier several techniques have been utilized to understand the molecular mechanism and identification of the key gene or protein–protein interaction that is responsible for causing GICs. Nevertheless, detecting key genes and protein–protein interaction through experimental equipment necessitates huge capital and time. Recently developed computational methods provide a distinct way to address such problems in a short interval of time with less cost. Thus, in the present chapter authors attempted to understand how computational approaches may help us in detecting key genes and protein associated with GICs. Information obtained revealed that several studies have employed computational methods to identify key hub genes, including *COL4A1* and *SERPINH1*, transcription factors (e.g., *MYC* and *MAZ*), and miRNAs (e.g., *miRNA-133b* and *miRNA-99a*) that play a key role in the gastric cancer development. Computational studies have also detected key hub genes (e.g., *AMBP* and *APOB*) and miRNAs (e.g., *miRNA-7* and *miRNA-141*) that play a key role in the development of colorectal cancer. However, all these studies performed analysis on the bulk cell level, which in turn provides less information about gene expression at the cellular level, which might be the reason for ineffective treatment and low survival of GICs patients. Thus, there is an urgent requirement to understand gene expression in GICs at the cellular level. In the near future, the information present in the present chapter will be highly valuable for cancer biologists and immunologists toward the treatment of GICs.

**Keywords** Gastric cancer · Computational approach · Key genes · Drugs

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## Chapter 11

# Immuno-Oncology of Colorectal Cancer



Ramachandra Reddy Pamuru, K. V. Sucharitha, and Ramakrishna Vadde

**Abstract** The colorectal cancer (CRC) a second leading cancer become most predominant and causing deaths worldwide. Since its spread, more attention has been made to control the CRC. For developing anti-tumor therapies, it is important to know the immune-oncology of CRC. A number of events are identified in the tumor microenvironment of CRC. This chapter gives details of the basics of CRC, immune cells of tumor microenvironment, tumor suppression, and repression. These details of tumor immune-oncology of CRC may help to provide better understanding of CRC and suggest ways to control CRC.

**Keywords** Colorectal cancer · Microenvironment · Immune cells · Immune response · Immunosuppression

### 11.1 Introduction

Colon carcinoma (CRC), a third leading cancer reported more than 1.2 million cases worldwide every year and second leading chronic disease in the USA (Rebecca et al. 2019). CRC occupies fourth place in mortality among all cancers in western countries (Globocan, Agency for research on cancer, WHO, 2017) whereas, in the USA 2nd death causing most common carcinoma among other cancers (Tenesa and Dunlop 2009; Jemal et al. 2009). It is very unfortunate that CRCs are silent tumors; they grow slowly and do not show most of the symptoms until they attain large size.

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183

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# Chapter 8 Therapeutic Vaccines for Gastrointestinal Malignancies



Bonala Sabeerabi, Venkat R. Arva Tatireddygari, and Ramakrishna Vadde

**Abstract** Gastrointestinal (GI) cancers are highly aggressive and display genome instability, gene mutations, immune suppression, immune insensitivity, and desmoplasia. GI cancers represent as one among the most common cancer type with a burden of ~25% worldwide, with each year about 4.5 million global deaths. GI cancers are not preventive, the prognosis of patients with advanced tumors was difficult, and treating the GI cancers is the only option. For many years, the treatment of GI cancer patients involve surgery, radiotherapy, and chemotherapy in combination or alone. The successes oncologists achieved so far was great but not enough, since it is only recently, the very first promising clinical data comes into light in 2015. Hence novel therapeutic ways to treat GI cancer were much required. Presently, it appears that immunotherapy is the answer. Immunotherapy is advancing quickly and outlines, a conventional shift in the treatment of GI cancer through its promising benefits beyond conventional treatments. Currently, researchers are examining a variety of medicines and factors like immune checkpoint inhibitors, ACT, peptide vaccines, cytokines, and antibodies to treat GI cancers. In recent years, the FDA approved the utilization of anti-PD-1, anti-VEGFR2, and anti-CTLA-4, immunotherapy against a few GI cancers including gastric cancer, liver cancer, and colorectal cancers. Among all the GI cancers, biliary tract cancer and pancreatic cancer patients have limited/no immunotherapeutic options at the moment, nonetheless ongoing clinical investigation will provide some assuring therapeutic solutions. It is highly important to overcome the various factors contributing to varied effectiveness of immunotherapy in GI cancers. Researchers are currently investigating the potentiality of cancer stem cells and their specific markers as targets: outcomes from

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## Chapter 7

# Monoclonal Antibody Therapy Against Gastrointestinal Tract Cancers



Gayatri Gouda, Manoj Kumar Gupta, Ravindra Donde, Lambodar Behera, and Ramakrishna Vadde

**Abstract** Gastrointestinal (GI) cancer is one of the leading causes of cancer death across the globe. To date, numerous techniques have been developed for the removal or destruction of cancer cells via surgery, radiation, or chemotherapy. However, these techniques have various side effects on the human body. In comparison to other techniques, recently developed monoclonal antibodies have fewer side effects. Thus their usage in cancer treatment has increased recently. Considering above, in this chapter, the authors attempted to understand the molecular feature associated with monoclonal antibodies and how they can be employed for the treatment of GI cancer. Information obtained revealed that the two most widespread techniques used for producing monoclonal antibodies are hybridoma and phage display. Since 1986, various monoclonal antibodies have been developed against numerous receptors/genes, namely epidermal growth factor receptor (EGFR), human epidermal growth factor 2 (HER2), HER4, VEGF, CD20, CD30, tumor necrosis factor member11, PD1 and IL4, that play a key role in causing GI cancer at different stages. For instance, panitumumab in combination with epirubicin, oxaliplatin, and capecitabine can be used for treating advanced esophageal gastro adenocarcinoma. Tremelimumab, a monoclonal antibody, works against anti-CTLA4 and can be used for the treatment of gastro cancer, colon cancer, and melanoma. However, few studies have reported that these monoclonal antibodies have side effects. For instance, mucositis was observed for the cetuximab antibody. Thus, the monoclonal antibody should be used carefully under the provision of the medical practitioner. In the near future, the information present in this chapter will be highly useful for treatment in GI cancer.

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97

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# Chapter 5 Immune Cell Therapy Against Gastrointestinal Tract Cancers



Ravindra Donde, Manoj Kumar Gupta, Gayatri Gouda,  
Sushanta Kumar Dash, Lambodar Behera, and Ramakrishna Vadde

**Abstract** Gastrointestinal (GI) cancers are responsible for major cancer-related mortality around the world. It has imposed a substantial burden and pressure on the healthcare sector across the globe. Recently advancements in high throughput techniques provide us with a unique opportunity to detect biomarkers and treat various diseases, including GI cancer, more comprehensively. However, most of these approaches are ineffective for treating patients with advanced or metastatic stages. Additionally, these treatments have severe side effects on cancer patients. Thus, there is an urgent requirement to identify new drugs and innovative immune therapies for the treatment of GI malignancies. Considering this, recently developed immune cell therapy provides a unique opportunity for early detection and treatment of various cancers, including GI cancer. It controls cancer either by activating or suppressing the immune system of cancer patients. Recently, immune checkpoints approaches have also been employed in the treatment and prevention of cancer. However, various studies have reported that few of these therapies have side effects. Thus, these therapies must be employed with utter caution. Recently several studies have also proposed that the personalized immunotherapy approach can also be used for therapeutic cancer treatment with fewer side effects. Authors believe that by employing classical and advanced immunotherapeutic techniques together, we can easily diagnose and treat GI cancer in a more comprehensive way. In the near future, the information present in this chapter will be highly useful for the early detection and treatment of various cancers, including GI cancer.

**Keywords** Gastrointestinal cancers · Immune cell therapy · Personalized immunotherapy · Immune checkpoints · Monoclonal antibody

---

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## Chapter 2

# Immunocomposition of Gastrointestinal Tract of Gut



Mekapogu Madakka, Nambi Rajesh, and Jinka Rajeswari

**Abstract** The human gastrointestinal tract (GI tract) is a distinctive organ occupied by a series of commensal microorganisms, while also being showed to an overwhelming load of antigens in the form of dietary antigens on a daily basis. The GI tract has played dual role in the body, in that it performs uptake of nutrients and digestion while also performing out the complex and principal task of maintaining immune homeostasis, i.e., maintaining the balance between the good and the bad. It is equally important that we protect ourselves from reacting against the good, meaning that we reside tolerant to harmless food, commensal bacteria and self-antigens, as well as react with force against the bad, meaning induction of immune responses against harmful microorganisms. This complex task is achieved through the presence of a highly efficient mucosal barrier and a specialised multifaceted immune system, made up of a large population of scattered immune cells and organised lymphoid tissues termed the gut-associated lymphoid tissue (GALT). This book chapter provides an overview of the primary components of the human mucosal immune system and how the immune responses in the GI tract are coordinated and induced.

**Keywords** Lamina propria · GALT · Mucosal immunity · Mucosal tolerance · Immune homeostasis · Gut microbiota

---

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17

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## Chapter 1

# Tumor Heterogeneity: Challenges and Perspectives for Gastrointestinal Cancer Therapy



Manoj Kumar Gupta, Gayatri Gouda, Ravindra Donde,  
and Ramakrishna Vadde

**Abstract** Cancer is clinically characterized via the uncontrolled proliferation of cells. Several studies have reported that tumor heterogeneity is the main reason for the low treatment response rate in cancer patients. Thus, there is always a quest to understand the tumor heterogeneity in any cancer type. In this chapter, the authors attempted to understand the types and drivers for tumor heterogeneity, especially in gastrointestinal cancers, and discussed their biological as well as clinical importance with respect to tumor evolution. Obtained information revealed that tumor heterogeneity can be either at inter- (amongst diverse tumors from diverse patients or within the same patients) or intra- (amongst diverse cells in the same tumor) level. Nevertheless, the main reason for inter-tumor heterogeneity is the intra-tumor heterogeneity. To understand this heterogeneity various high throughput sequencing approaches, for instance, single-cell RNA sequencing, and models, for instance, the “Clonal evolution” model and “big bang” model, have been developed to date. However, the complete mechanism associated with tumor heterogeneity remains elusive to date. Authors believe that by integrating information obtained from various disciplines, including pathology, clinical-radiology, genetic and molecular biology, we can unravel the mechanism comprehensively associated with tumor heterogeneity. In the near future, the information present in this chapter will be highly useful for the early detection and prevention of gastrointestinal cancer in humans.

**Keywords** Cancer · Heterogeneity · Clonal evolution model · Cancer stem cell model · Tumor

---

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# Immunotherapy for Gastrointestinal Malignancies

 Springer

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# Contents

<b>1</b>	<b>Tumor Heterogeneity: Challenges and Perspectives for Gastrointestinal Cancer Therapy</b> . . . . .	1
	Manoj Kumar Gupta, Gayatri Gouda, Ravindra Donde, and Ramakrishna Vadde	
<b>2</b>	<b>Immunocomposition of Gastrointestinal Tract of Gut</b> . . . . .	17
	Mekapogu Madakka, Nambi Rajesh, and Jinka Rajeswari	
<b>3</b>	<b>Immunomarkers for Detection of GI Malignancies</b> . . . . .	41
	Ravikiran Tekupalli, Santosh Anand, Sowbhagya Ramachandregowda, Anupama Sindhghatta Kariyappa, and Bhagyalakshmi Dundaiah	
<b>4</b>	<b>Immunotherapeutics of Gastrointestinal Malignancies</b> . . . . .	51
	Nakka Venkata Prasuja	
<b>5</b>	<b>Immune Cell Therapy Against Gastrointestinal Tract Cancers</b> . . . .	61
	Ravindra Donde, Manoj Kumar Gupta, Gayatri Gouda, Sushanta Kumar Dash, Lambodar Behera, and Ramakrishna Vadde	
<b>6</b>	<b>Immune Checkpoint Inhibitors in Gastrointestinal Malignancies</b> . . .	79
	Padmaraju Vasudevaraju and Malla Rama Rao	
<b>7</b>	<b>Monoclonal Antibody Therapy Against Gastrointestinal Tract Cancers</b> . . . . .	97
	Gayatri Gouda, Manoj Kumar Gupta, Ravindra Donde, Lambodar Behera, and Ramakrishna Vadde	
<b>8</b>	<b>Therapeutic Vaccines for Gastrointestinal Malignancies</b> . . . . .	113
	Bonala Sabeerabi, Venkat R. Arva Tatireddygar, and Ramakrishna Vadde	
<b>9</b>	<b>Immuno-Oncology of Oesophageal Cancer</b> . . . . .	159
	Bindu Prasuna Aloor and Senthilkumar Rajagopal	

10	<b>Association Between IL6 Gene Polymorphisms and Gastric Cancer Risk: A Meta-Analysis of Case-Control Studies</b> . . . . .	171
	Henu Kumar Verma, Neha Merchant, and L. V. K. S. Bhaskar	
11	<b>Immuno-Oncology of Colorectal Cancer</b> . . . . .	183
	Ramachandra Reddy Pamuru, K. V. Sucharitha, and Ramakrishna Vadde	
12	<b>Immune Targets in Colorectal Cancer</b> . . . . .	205
	Begum Dariya and Ganji Purnachandra Nagaraju	
13	<b>Applications of Computational Biology in Gastrointestinal Malignancies</b> . . . . .	231
	Manoj Kumar Gupta and Ramakrishna Vadde	

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# ACID AND ALKALI PRETREATMENT METHODS OF GROUNDNUT FODDER FOR EFFICIENT HYDROLYSIS AND CELLULASES PRODUCTION IN SOLID STATE FERMENTATION

---

*Dr M. Subhosh Chandra*

*Dr K. Shruthi*

*Dr P. Suresh Yadav*

*Dr M. Srinivasulu*

## Introduction

**P**retreatment of lignocellulosic biomass to overcome its intrinsic recalcitrant nature prior to the production of value-added products has been studied for almost 200 years. Lignocellulosic biomass is renewable bioresource on earth and is a suitable raw material for wide variety of applications for sustainability (Kumar and Sharma, 2017). Although, because of the complex structure and recalcitrant nature of lignocellulosic biomass pretreatment steps present the most critical challenge

---

## Chapter 23

# Recent trends and future prospective of fungal cellulases for environmental management

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### 1 Introduction

Cellulases (EC 3.2.1.4) catalyze the hydrolysis of  $\beta$ -1,4-glycosidic linkages in cellulose, and play a significant role in nature by recycling this polysaccharide which is the main component of the plant cell wall (Srivastava et al., 2018a,b). These enzymes act in combination with other hydrolytic enzymes to ensure that the polysaccharide is completely degraded to soluble sugars, namely cellobiose and glucose, which are then assimilated by the cell (Amore et al., 2013). Microorganisms are recognized as effective producers of cellulase, and bacteria, as well as fungi, are considered major sources for the production of cellulase. In particular, bacteria (e.g., aerobic and anaerobic bacteria) and fungi (e.g., soft-rot fungi, white-rot fungi, and brown-rot fungi) are known to be potential cellulase producers among different types of microorganisms (Srivastava et al., 2018a,b). The enzyme produced has a different structure and mechanism for binding to the substratum, depending on the microorganism (Juturu and Wu, 2014). Cellulases formed by the fungi and aerobic bacteria are released as free molecules from the cell into the extracellular medium. In contrast, anaerobic bacteria produce cellulases that remain bound to the surface of the cell in a protein complex called cellulosome. By comparison, cellulases formed by aerobic microorganisms have a different architecture, with two domains: one for cellulose binding and the other as a catalytic site, and a peptide that links the domains (Siqueira et al., 2020). Certain structures on the protein can also be present, with many functions. The huge potential of cellulases in biotechnology is the driving force behind ongoing basic and applied work into these biocatalysts. Nevertheless, fungi are often favored over bacteria for efficient cellulase production because of their flexible use of substrates and their ability to penetrate (Behera et al., 2017). Although the fungi have the ability to produce better cellulase, it is very rare to have a single fungus possessing

all the components of the cellulase system for successful biomass hydrolysis (Srivastava et al., 2018a,b).

Fungal cellulases have now found application in many fields, such as animal feeding, brewery and wine, meat, textile and laundry, and pulp and paper industries. Increasing interest in transforming lignocellulosic biomass into fermentable sugars has created a further market for cellulases and their related enzymes (Kuhad et al., 2011). Additionally, biomass conversion has significant advantages over other alternative energy production methods, as lignocellulose is the most abundant and renewable biomaterial on our planet (Ahorsu et al., 2018). According to recent market reports on enzymes, the main sectors in which cellulase enzyme is increasingly being applied are health care, textiles, pulp and paper, detergent, food, and beverages (Jayasekara and Ratnayake, 2019). Its wide application is related to the food and beverage segment in coffee processing, wine making, and fruit juice production (Kumar et al., 2019). This is commonly used in many industrial applications to manufacture detergents for the laundry and cleaning and washing agents. This chapter provides an outline of fungal cellulases that have been characterized and the applications of these enzymes in the environmental management.

### 2 Cellulolytic microorganisms

Cellulases are represented by a broad range of naturally occurring microorganisms and cellulolytic microorganisms mainly use carbohydrates for their nutrition but cannot use proteins or lipids as sources of energy. Screening and isolation of cellulase-producing microbes from nature is one of the important ways to get novel cellulases. These newly screened microbes are sources of new cellulase genes with diverse properties. Cellulolytic bacteria and fungi that secrete free enzymes rely on the hydrolysis of lignocellulose

A Taxonomic Revision of the Genus  
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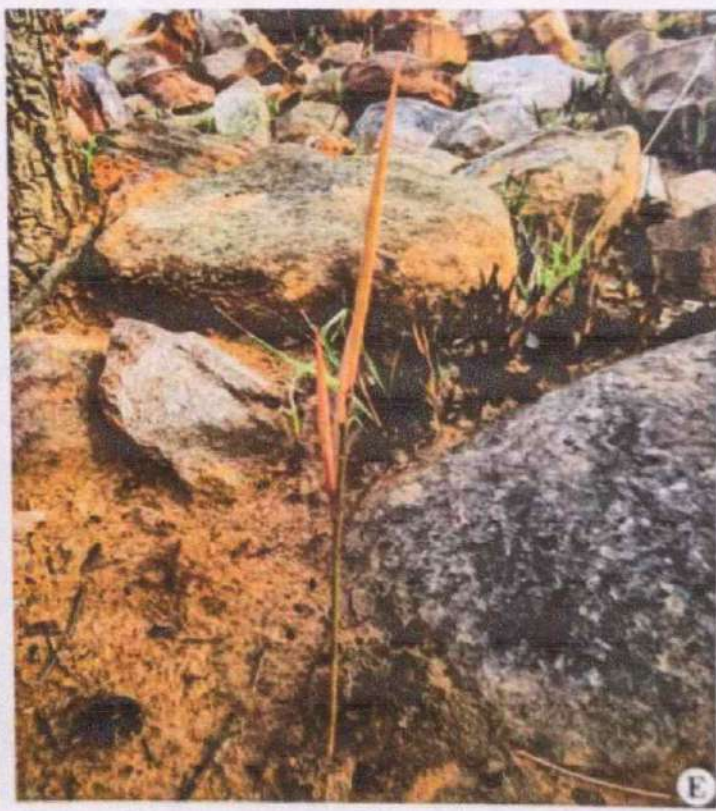
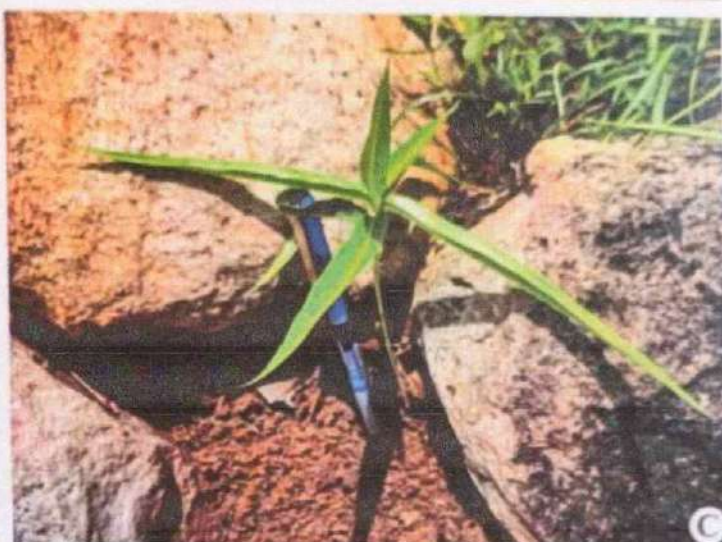
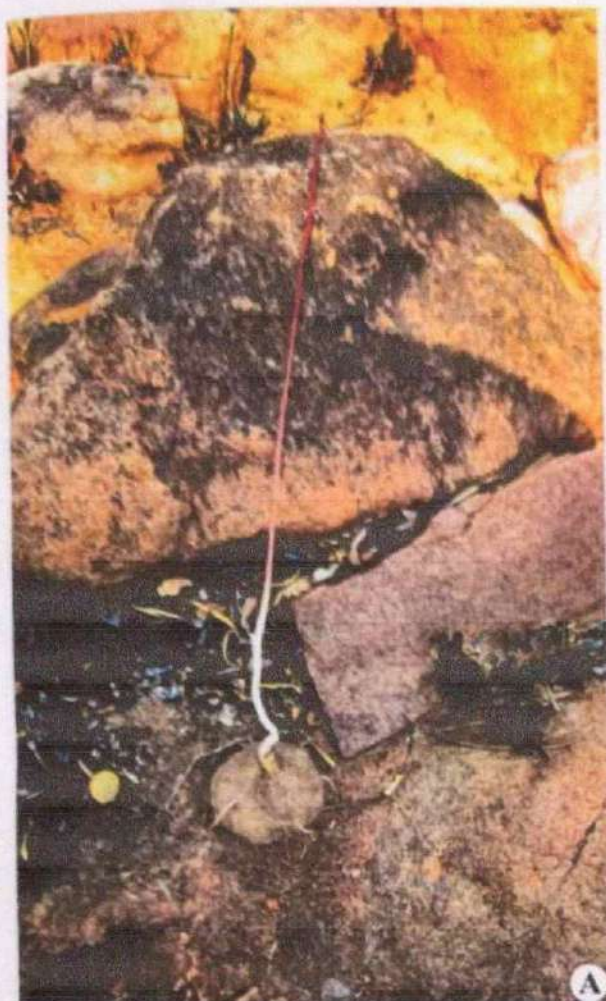
var. mahajanii .....	71
var. mahendragiriense (K. Prasad et al.) K. Prasad & Venu .....	72
var. saldanhae (Britto & Bruyns) K. Prasad & Venu .....	74
<i>Brachystelma rapinatianum</i> Britto & Bruyns .....	77
<i>Brachystelma matthewianum</i> Bruyns & Britto .....	77
<i>Brachystelma ananthapuramense</i> K. Prasad et al. ....	79
<i>Brachystelma bilobatum</i> Sadas. & K. Prasad .....	83
<i>Brachystelma gondwanense</i> Govekar et al. ....	85
<i>Brachystelma kadapense</i> M. Sridhar Reddy et al. ....	86
<i>Brachystelma shrirangii</i> Kambale et al. ....	90
<i>Brachystelma kolarense</i> Arekal & T.M. Ramakrishna .....	90
var. kolarense .....	91
var. malwanense (S.R. Yadav & N.P. Singh) K. Prasad & Venu .....	94
var. naorojii (P. Tetali et al.) K. Prasad & Venu .....	94
<i>Brachystelma nigidianum</i> Raja Kullayisw. et al. ....	97
<i>Brachystelma brevitubulatum</i> (Bedd.) Gamble .....	100
<i>Brachystelma volubile</i> Hook.f. ....	102
<i>Brachystelma seshachalamense</i> K. Prasad & Prasanna .....	103
<i>Brachystelma ariyittaparensis</i> (P. Biju et al.) K. Prasad & Venu .....	107
References cited.....	109
Index to Scientific names.....	115



**Brachystelma kadapense** M. Sridhar Reddy, C. Ankalaih, T. Mastan, C. Venkata Ramana, K. Prasad & Venu *sp. nov.* (Plates 29 & 30).

*Type:* India: Andhra Pradesh, Kadapa district, Guvvalcheruvu reserve forest, 14° 19' 0.1" N, 78° 45' 45.8" E, 478 m, 22.04.2015, C. Ankalaih, T. Mastan & M. Sridhar Reddy 5252 (holo: CAL; iso: BSID)

*Etymology:* The new species is named after Kadapa district, a part of the Southern Eastern Ghats of Andhra Pradesh, from where the type material was collected.



**Plate 29:** *Brachystelma kadapense* M. Sridhar Reddy, C. Ankalaiah, T. Mastan, C. Venkata Ramana, K. Prasad & Venu *sp. nov.*: A. flowering habit (during summer); B. flowers; C. vegetative habit (during rainy season). D-E: follicle(s).

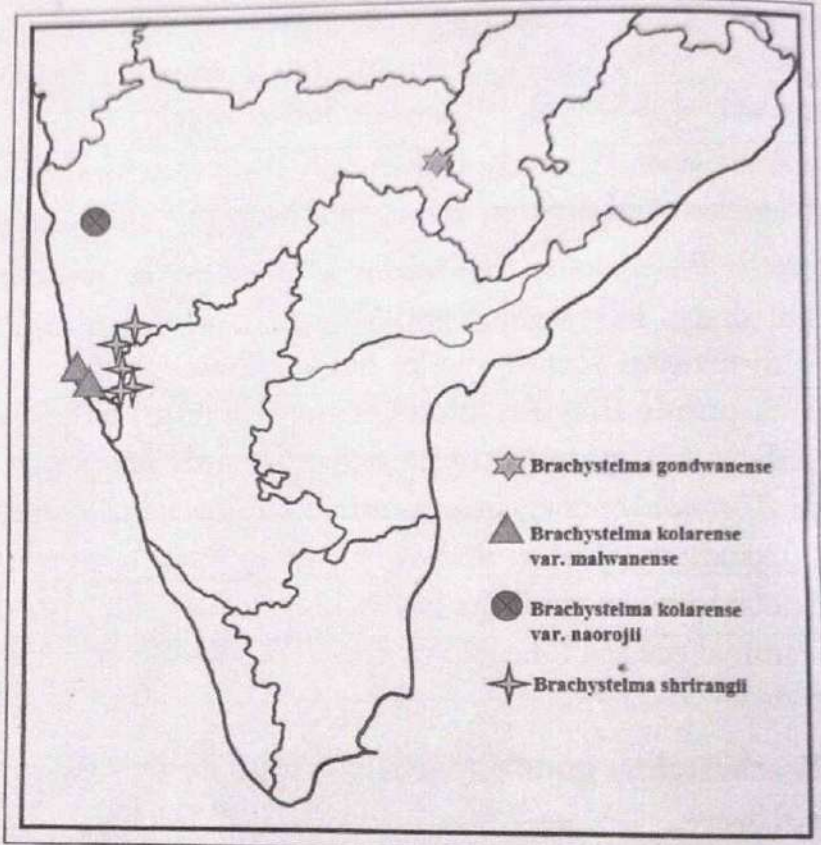
glandular or not, persistent; bracts *c.* 8 × 0.5 mm; bracteoles *c.* 3 × 0.3 mm. Calyx lobes 3–4 mm, triangular, acute at apex, glandular-hairy, yellowish-green. Corolla lobes 14–18 × 1.5–2 mm, erect but twisted while opening, linear or subcylindrical, acute at apex, involute at margins, 2–3 mm long, scattered white hairy inside and on margins, more dense in the lower half and almost absent near tip, pale yellow, with irregular purple blotches, yellowish-green above, with few purplish blotches only towards base. Corona bowl shaped; interstaminal corona *c.* 3 mm across, slightly longer than the gynostegium, 5-lobed; lobes shallowly bifid, hairy inside, glabrous otherwise, yellowish-white, with purple dots; staminal corona lobes incumbent, lanceolate, white, blotched with deep purple. Pollinium ovoid. Follicles in pairs, 8–10 cm long, pinkish.

*Fl. & Fr.*: April–June.

*Habitat*: The species is found mostly in dry to moist deciduous lowland mixed forests with clayey-gravelly to loamy soils at 160–200 m altitude.

*Distribution*: Maharashtra, known only from type locality (Map 9).

*Notes*: This is a hysteranthous species (flowering stage is followed by vegetative stage). Higher temperatures in summer seem to trigger flowering. Plants remain vegetative during monsoon, from July to November.



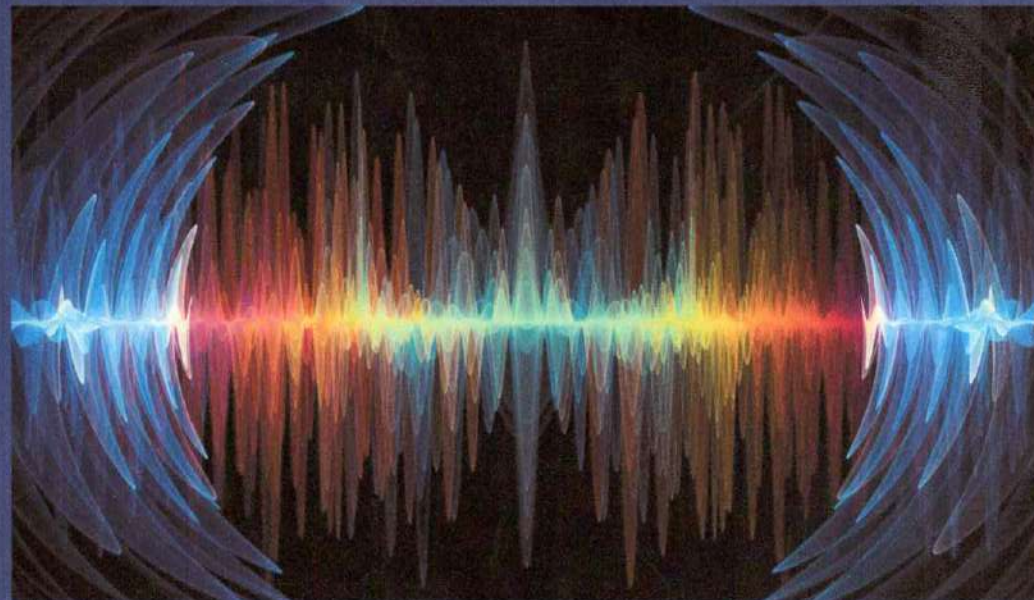
**Map 9:** Known locations for *B. gondwanense*, *B. kolarense* var. *malwanense*, *B. kolarense* var. *naorojii* and *B. shrirangii*.

***Brachystelma kadapense*** M. Sridhar Reddy, C. Ankalaih, T. Mastan, C. Venkata Ramana, K. Prasad & Venu *sp. nov.* (Plates 29 & 30).

*Type*: India: Andhra Pradesh, Kadapa district, Guvvalcheruvu reserve forest, 14° 19' 0.1" N, 78° 45' 45.8" E, 478 m, 22.04.2015, C. Ankalaih, T. Mastan & M. Sridhar Reddy 5252 (holo: CAL; iso: BSID)

*Etymology*: The new species is named after Kadapa district, a part of the Southern Eastern Ghats of Andhra Pradesh, from where the type material was collected.

Naturally occurring solid compounds like minerals and plant materials are widely used in medicine, industry, agriculture and also in daily life. Therefore, the identification and structural determination of trace metals in naturally occurring minerals and plant materials by spectroscopic techniques is one of the main objectives in solid state spectroscopy. In the present investigation, attempts have been made to identify and characterize the trace transition metal ions in minerals and plant materials using elemental analysis (EPMA, ICPMS, and CHNS) and selected spectroscopic methods (Mössbauer, EPR, Optical absorption, IR and Raman studies).



N. C. Gangi Reddy  
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Dr. N.C. Gangi Reddy currently working as an Associate Professor in the Department of Chemistry, Yogi Vemana University, Kadapa. His research interests are i) Design and development of medicinally valuable organic compounds; and ii) Identification and characterization of trace metals in naturally occurring geological and biological compounds.



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## Spectral Investigation of Transition Metal Compounds

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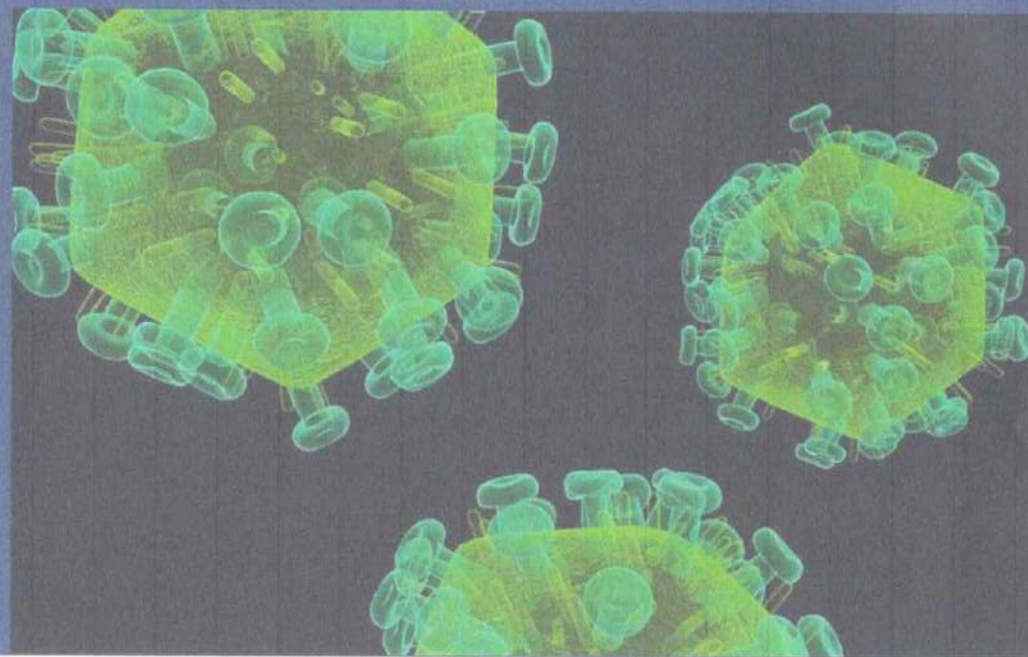
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This book, explains the organic functional groups of Terminalia bellirica fruit extract is most effectively and rapidly synthesized different nanoparticles by comparing with Limonia acidissima leaf extract. The synthesized Ag, Cu (UCuNPs), Pd and Au nanoparticles, ultra-small copper nanoparticles showed good antimicrobial activity by comparing with other metals. Because of its size, it plays a pivotal role to inhibit microbially, the size of smaller copper ions (2-7 nm). Future studies should include elucidation of the scope and mechanism of this method, followed by the extension of this reaction to other materials, including noble metal particles and bimetallic materials, as well as the synthesis of new Bunte salts with functional groups specific to a given application. Many of the challenges described in the previous chapters could be remediated by borrowing a key principle from another, demonstrating that new materials are rarely produced from entirely green methods at inception, yet many of the processes are easily improved.



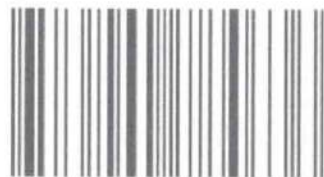
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Adinarayana Reddy Somala

# Biosynthesis of metallic nanoparticles and its applications

Noblemetal nanoparticles



Dr. Annavaram Viswadevarayalu received his Master's degree from Sri Venkateswara University, Andhra Pradesh, India in 2010, and his Ph.D. from Yogi Vemana University, and Andhra Pradesh, India in 2016. He worked as a Postdoctoral researcher in Jiangsu University, China during the year 2017-2019.



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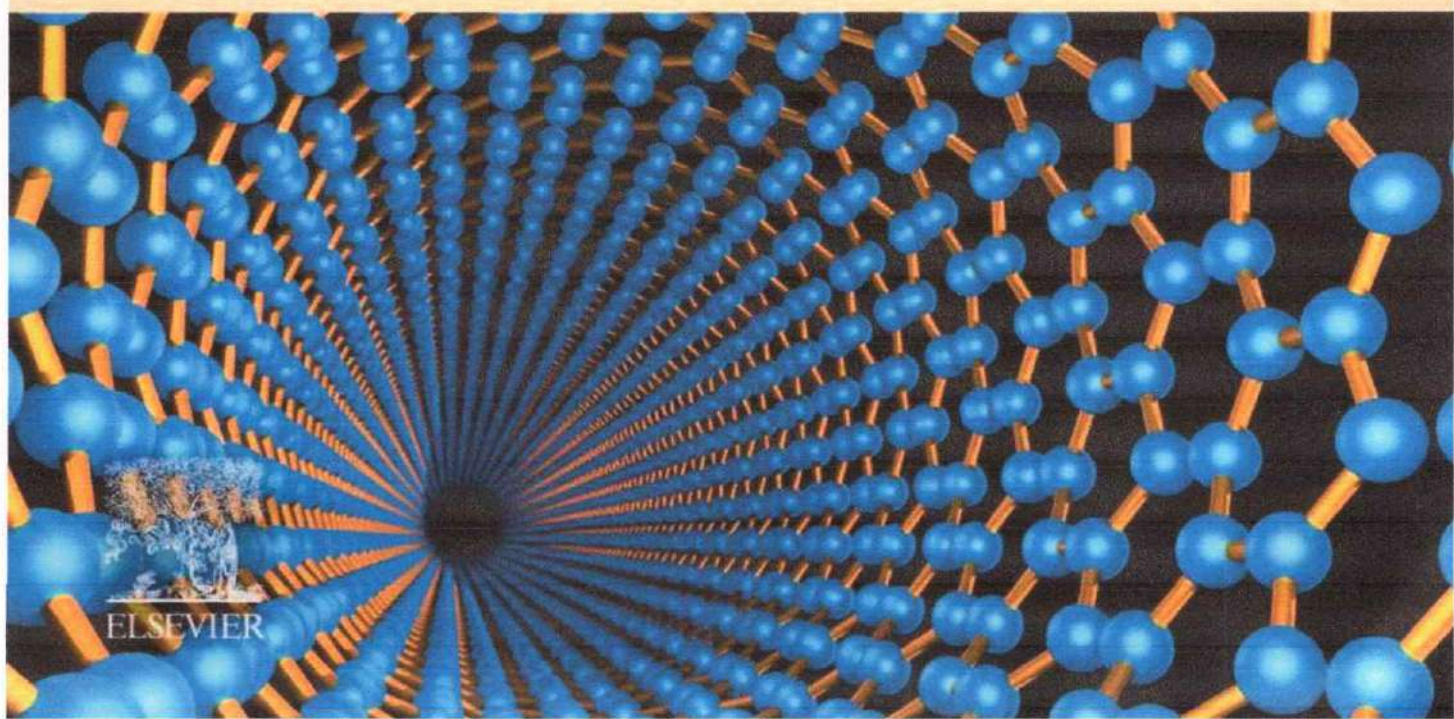
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# Nanostructured, Functional, and Flexible Materials for Energy Conversion and Storage Systems

Edited by  
**Alagarsamy Pandikumar and Perumal Rameshkumar**



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## CHAPTER 9

# Graphitic carbon nitride—based nanocomposite materials for photocatalytic hydrogen generation

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### 1. Introduction

Exploitation of efficient techniques for clean and renewable energy is a crucial strategy to defend the global energy demands. In this connection, the photocatalytic water splitting into gaseous hydrogen (H<sub>2</sub>) and oxygen (O<sub>2</sub>) by using solar energy has been regarded as a promising and sustainable strategy [1–3]. In the past few decades, various semiconductor materials, e.g., TiO<sub>2</sub> [4], ZnO [5], Fe<sub>2</sub>O<sub>3</sub> [6], SnO<sub>2</sub> [7], ZrO<sub>2</sub> [8], Ag<sub>3</sub>PO<sub>4</sub> [9], BiVO<sub>4</sub> [10], CdS [11], NiS [12], etc., have been reported for photocatalytic hydrogen evolution reaction (HER) under UV, visible, and solar light illumination. Also, other wide range of semiconductor composite photocatalysts such as noble metal/metal oxides, quantum dot—based composites, and carbanious were extensively investigated for photocatalytic H<sub>2</sub> generation applications [13,14]. Unfortunately, metal oxide—based semiconductors possess a wide band gap which restricted their light absorption in UV spectrum of solar energy. On the other side, metal sulfides, metal phosphides, and metal nitrides (e.g., CdS ~ 2.4 eV, SnS<sub>2</sub> ~ 1.7 eV, Ni<sub>2</sub>P ~ 1.0 eV, InP ~ 1.4 eV, InN ~ 1.1 eV, etc.) have also been taken into account because they possess a narrow band gap with suitable band potential for photocatalytic HER; however, the photocorrosion and self-oxidation make them generally deleterious and volatile which limit their further application [3,15]. Hence, in the search of robust visible light active semiconducting photocatalyst, the g-C<sub>3</sub>N<sub>4</sub>, a polymeric semiconductor, has gradually opened up a new field of vision in photocatalytic HER since the pioneering study in 2009 by Wang

# Emerging trends in photocatalytic transformation of biomass-derived glycerol into hydrogen fuel and value-added chemicals

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## 11.1 Biorefinery concept in photocatalytic H<sub>2</sub> production and synthesis of value-added chemicals

Ever-increasing consumption of fossil fuels in transportation, domestic, and energy sectors releases greenhouse gases which results in global warming and unusual climate change, leading to irreversible damage to the environment [1,2]. In order to cater to the demand for energy and to overcome these environmental problems, new or improved energy resources that will produce alternative, renewable, and sustainable energy are being explored. Among the sustainable resources explored, biomass can be transformed into a variety of value-added products in solid, liquid, and gaseous forms, which can also supply energy in the forms of electricity, heat, and transport biofuels [3–5]. Among the lignocellulosic biomasses, cellulose is important as it is the major component of biomass and is useful in the production of a variety of chemicals, fuels, and other value-added products. The annual manufacture of lignocellulosic biomass globally is reported to be roughly 172 billion tons. Different sources of energy, biomass, and its conversion into fuels, chemicals, and other materials are illustrated in Fig. 11–1.

Acknowledgments	214
References	215
<b>Section III Emerging applications of photocatalytic materials</b>	<b>225</b>
11. Emerging trends in photocatalytic transformation of biomass-derived glycerol into hydrogen fuel and value-added chemicals	227
<i>V. NAVAKOTESWARA RAO, T.J. MALU, K.K. CHERALATHAN, M. SAKAR, CHAUDHERY MUSTANSAR HUSSAIN, M. MAMATHA KUMARI AND M.V. SHANKAR</i>	
11.1 Biorefinery concept in photocatalytic H <sub>2</sub> production and synthesis of value-added chemicals	227
11.2 Photocatalytic H <sub>2</sub> production using biomass-derived glycerol	229
11.3 Opportunities in conversion of biomass-derived glycerol into value-added chemicals	235
11.4 Conclusion and future prospects	241
References	242
12. Two-dimensional MXene-based heterostructures for photocatalysis	247
<i>VISHAL SHARMA, ASHISH KUMAR AND VENKATA KRISHNAN</i>	
12.1 Introduction	247
12.2 Synthesis strategies for MXenes and MXene-based heterostructures	249
12.3 Photocatalytic applications	253
12.4 MXenes-based materials for photocatalytic water splitting reaction	259
12.5 MXene-based materials for pollutants degradation	261
12.6 Summary and perspectives	263
References	264
Index	269

# Handbook of Smart Photocatalytic Materials

Environment, Energy, Emerging Applications, and Sustainability

Edited by  
Chaudhery Mustansar Hussain  
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# Contents

List of contributors xi

Section I	Photocatalytic materials for energy	1
1.	<b>Ferroelectric semiconductors for photocatalytic energy and environmental applications</b>	3
	<i>M. SAKAR, R. MITHUN PRAKASH, CHAUDHERY MUSTANSAR HUSSAIN AND M.V. SHANKAR</i>	
1.1	Introduction	3
1.2	Mechanism of ferroelectric photocatalysis	5
1.3	Applications	7
1.4	Conclusion and outlook	15
1.5	Acknowledgment	15
	References	15
Section II	Photocatalytic materials for environmental protection	21
2.	<b>Metal-oxide semiconductor photocatalysts for the degradation of organic contaminants</b>	23
	<i>ANJALU RAMCHIARY</i>	
2.1	Introduction	23
2.2	Photocatalytic mechanism and evaluation methods	24
2.3	Strategies for enhancing photocatalytic performance	26

# Ferroelectric semiconductors for photocatalytic energy and environmental applications

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## 1.1 Introduction

Photocatalysis is a process that delivers multiple applications toward energy production and environmental remediation [1,2]. It is the photocatalyst that through its band edge potential and charge carrier dynamics largely decides its application. For instance, Fig. 1–1 shows the band edge position that dictates the prerequisite for a photocatalyst to perform the hydrogen and oxygen evolution reaction [3]. Other than the appropriate positioning of band edge potentials, the other parameters such as effective separation of charge carriers, increased recombination resistance, carrier transportation at the interface, surface reactions, surface adsorption of molecules of the photocatalysts are important for the photocatalytic process to be conducted efficiently for any given application [4,5]. With such insights, photocatalysts are equipped with additional materials via doping [6], plasmonic metal sensitization [7], cocatalyst loading [8], etc. and designed with various configurations such as heterojunction [9] and Z-scheme [10] toward enhancing the specific properties of the photocatalyst system. The process of doping was initially found to be helpful in tuning the band structure in photocatalysts; however the major shortfall of doping is the reduction of lifetime of the charge carriers as it often acts as recombination centers in the system [11,12]. Later, the other techniques known as the formations of heterojunction have become an important modification process to produce the hybrid photocatalyst to enhance the overall photocatalytic process in the system [13]. These heterojunction formations basically include the categories such as semiconductor–semiconductor (e.g., typical composites) [14], semiconductor–metal (e.g., plasmonic and cocatalyst loading) [15],

141

This book explains the major experimental finding on synthesis, characterization and photocatalytic activity of  $\text{TiO}_2$  based 1-D nanocomposite materials for highly efficient hydrogen ( $\text{H}_2$ ) production under solar light irradiation. A simple and effective hydrothermal method was adopted for synthesis of one-dimensional nanostructure such as nanotubes and nanorods. Calcination and impregnation techniques were adopted to improve the crystallinity of pristine titanates and deposition of narrow band gap metal oxides such as  $\text{Ag}_2\text{O}$ ,  $\text{CuO}$  and  $\text{Cu}_2\text{O}$  on the surface of  $\text{TiO}_2$  nanostructures. The surface and structural properties of photocatalysts were studied using various characterization techniques. Experimental conditions such as morphologies of catalyst, crystal phase composition, surface chemical composition, amount of catalyst in suspension, water splitting reaction with or without organic scavengers were optimized to achieve the best rate of  $\text{H}_2$  production. The present study also applicable to bio-mass derived glycerol as sacrificial agent in photocatalytic  $\text{H}_2$  production paves the sustainable way to dispose-off industrial waste into  $\text{H}_2$  fuel.



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Dr. Praveen Kumar Dharani was born on 1<sup>st</sup> august 1987 in Vidvath Khani (Gani) village, Andhra Pradesh, India. He obtained Doctoral degree (Ph.D.) in the area of nanocatalysis for photocatalytic  $\text{H}_2$  production on November 2015 from the Department of Materials Science and Nanotechnology, Yogi Vemana University, Kadapa, Andhra Pradesh, India.

## $\text{TiO}_2$ Based Nanocomposite Photocatalysts for Efficient $\text{H}_2$ Production



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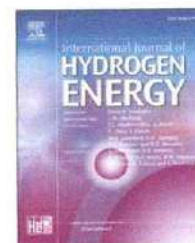
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## Editorial

## Preface to the special issue on the 2nd International Conference on Sustainable Environment and Energy (ICSEE – 2019)



The second International Conference on Sustainable Environment and Energy (ICSEE – 2019) was organized by the Hindustan Institute of Technology and Science on 21st & 22nd of February, 2019 in Chennai, India. The aim of this conference is to provide a common platform for the scholars, scientists, academicians and industrial experts who are actively involved in the promotion and execution of research in the field of sustainable environment and energy. The conference covered a broad spectrum of topics including sustainable building materials, waste management, hydrogen production and storage, sustainable energy production, materials and manufacturing. The first ICSEE conference held in 2017 witnessed a phenomenal success in bringing experts in the field of energy. The International Journal of Hydrogen Energy (IJHE) brought a special issue covering a large number of scientific works presented in the 1st ICSEE – 2017.

The present 2nd ICSEE – 2019 conference witnessed 131 and 50 poster presentations in addition to invited plenary and key note lectures. All the contributed authors were invited to submit full length articles to the special issue of International Journal of Hydrogen Energy (IJHE). A total of 40 papers falls under the scope of IJHE were sent for the peer review and 30 papers were recommended for publication. Majority of the papers deal with the hydrogen production technologies such as photocatalytic water splitting, hydrogen recovery from industrial wastewaters, photobiological hydrogen production etc.,. The emphasis was made on exploring convenient fabrication methodologies for developing photocatalysts with controlled structures for enhanced hydrogen production. Some papers reported promising possibilities offered by nanocomposites for hydrogen evolution reaction (HER) and oxygen reduction reaction (ORR). Another two papers discuss both experimental and theoretical aspects of prevention of cathodic flooding in proton exchange membrane fuel cells. In

addition, two papers were particularly focused on the designing of photoreactors for the recovery of hydrogen from industrial sulphide wastewaters. Four review articles covered the recent progress on metal – organic frame works, metal oxy nitrides, metal-doped TiO<sub>2</sub>, non-metal doped TiO<sub>2</sub> nano-structures, interface engineering in the carbonaceous titania for photocatalytic hydrogen production. Some papers were dedicated to the development of cathode materials for zinc ion battery, graphene-based counter electrodes for dye sensitized solar cell, and composite membranes for fuel cell applications.

The guest editors take this opportunity to profusely thank all the prospective authors, IJHE editors and staff for their unstinted support for making this IJHE special issue on 2nd ICSEE – 2019 most successful.

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Sadhan Kumar Ghosh *Editor*

# Urban Mining and Sustainable Waste Management

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<b>Recycling of Polymers from WEEE: Issues, Challenges and Opportunities</b> .....	69
Biswajit Debnath, Ranjana Chowdhury and Sadhan Kumar Ghosh	
<b>Slate Mine Wastewater, the Best Substitute for Cementation</b> .....	81
S. Altaf Hussain, S. M. Subhani and S. V. Satyanarayana	
<b>Waste Coal Utilization in India: A Review</b> .....	91
Krishna Kant Dwivedi, Prabhansu, M. K. Karmakar, A. K. Pramanick and P. K. Chatterjee	
<b>Temporal Changes of Solid Waste at Limestone Quarries in and Around Yerraguntla, YSR District, A.P., using Google Earth Images</b> .....	99
Y. Sudarshan Reddy, B. Suvarna, M. Prasad, V. Sunitha and M. Ramakrishna Reddy	
<b>Waste Is not a Waste—It's Time to Realize</b> .....	111
M. Rao Divi	
<b>Effective Treatment for COD Removal of Landfill Leachate by Electro-coagulation</b> .....	129
P. T. Dhorabe, A. R. Tenpe, V. S. Vairagade, Y. D. Chintanwar, B. R. Gautam and V. R. Agrawal	
<b>Estimation of Greenhouse Gas Emissions from Matuail Landfill Site</b> .....	149
Md. Maruful Hoque and M. Tauhid Ur Rahman	
<b>Stabilization of Contaminated Soil in a Landfill Site with Ground Granulated Blast Furnace Slag</b> .....	161
Ramiz Raja and Supriya Pal	
<b>Air Quality Survey of Some Major Dumpsites in Lagos State, Nigeria</b> .....	169
Omowonuola Olubukola Sonibare, Adeniyi Saheed Aremu, Rafiu Olasunkanmi Yusuf and Jamiu Adetayo Adeniran	
<b>Remediation of bis(2-Ethylhexyl) Phthalate and Phenol, 4,4'-(1-Methylethylidene)bis—in Landfill Leachate Using Biopolymer</b> .....	185
P. Agamuthu, A. Aziz, A. Hassan and S. H. Fauziah	
<b>Biodegradation of Plastic Waste Using Marine Micro-Organisms</b> .....	195
Rwiddhi Sarkhel, Shubhalakshmi Sengupta, Papita Das and Avijit Bhowal	
<b>Current Scenario of Plastic Waste Management in India: Way Forward in Turning Vision to Reality</b> .....	203
Tadinada Sri Sasi Jyothsna and Bandari Chakradhar	

# Temporal Changes of Solid Waste at Limestone Quarries in and Around Yerraguntla, YSR District, A.P., using Google Earth Images



Y. Sudarshan Reddy, B. Suvarna, M. Prasad, V. Sunitha  
and M. Ramakrishna Reddy

**Abstract** In limestone mining and cement industry, solid and liquid wastes are generated in every day and every stage of the operations and are required to mitigate properly. Different types of waste generated from both the industries are cement and limestone quarry. Due to environmental impact and public health and safety, proper efforts must be made to decrease waste generation and hence efficient disposal practices have to be followed. Hence, this study aims at a better understanding of spatial and temporal changes of unplanned dumping sites from 2006 to 2018. Google Earth mapping is one of the most advanced methods for identification of rock-solid waste clearly for collecting on satellite image data. This paper is centered on application of Google Images in assessing the temporal changes of solid waste at limestone quarries in and around Yerraguntla. Time series multi-date Google Earth imageries of 2006–2018 are used to demarcate the evolutionary changes in limestone waste disposal management and to understand the spatial and temporal changes that happened due to the changes by expanding the rock waste dump around Yerraguntla village, YSR district, A.P. Results revealed that the solid waste management in the study area is very poor which need to be properly monitored so as to mitigate the present and future environmental threats.

**Keywords** Temporal changes · Solid waste · Limestone quarries · Google Earth · Yerraguntla

## 1 Introduction

Waste is defined as the discarded and discharged material generated during every stage of life causing adverse health and environmental impact (Bringi 2007). Environmental contamination and waste management are the major concerns to earth scientist and form other related fields of science all over the world both in developing

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In view of associated environmental problems and their impacts on public health and safety, efforts must be made to minimize waste generation; systematic disposal practices must be followed. Hence, this study aims at a better understanding of spatial and temporal changes of unplanned dumping sites from 2006 to 2018. Google earth mapping is one of most advanced method for identification of rock solid waste clearly for collecting on satellite image data. This paper is centered on application of Google images in assessing the temporal changes of solid waste at limestone quarries in and around Yerraguntla. Time series multi date Google Earth Imageries of 2006 to 2018 are used to demarcate the evolutionary changes in Limestone waste disposal management and to understand the spatial and temporal changes that happened due to the changes by expanding the rock waste dump around Yerraguntla village, YSR district, A.P. Contamination in drinking water is the most common form of environmental problems encountered in water resources management.



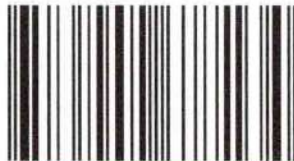
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## Solid Waste Management and Hydro Geochemistry of Limestone Quarries

in and around Yerraguntla Town,  
Y.S.R District, A.P



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