

**National Seminar**  
On  
**NEW VISTAS IN CHEMISTRY**  
**(NVC 2015)**

**1-2 December, 2015**



*Organized by*  
**RESEARCH AND POST GRADUATE DEPARTMENT OF CHEMISTRY**  
**MES KEVEEYAM COLLEGE VALANCHERY**  
**MALAPPURAM-KERALA**

*Sponsored by*  
**University Grants Commission**



## M E S KEVEEYAM COLLEGE VALANCHERY

### Malappuram-Kerala

Phone: 0494 – 2644380, 2642670, 2641347(Fax)

[www.meskvmcollege.org](http://www.meskvmcollege.org), Email: [principal@meskvmcollege.org](mailto:principal@meskvmcollege.org)


Date:20/11/2015

#### CIRCULAR

PG and Research Department of Chemistry, MES KeVeeYam Valanchery, decide to organize a two days National Seminar on "New vistas in chemistry (NVC 2015)" on on 1st and 2nd of December 2015. All staffs and students are hereby notified to be present for the successful conducting of the function.

  
Head of the Department



  
Principal  
M.E.S KEVEEYEM COLLEGE  
VALANCHERY, PIN- 676 557  
MALAPPURAM

## **ABOUT OUR INSTITUTION**

MES KEVEEYAM COLLEGE, VALANCHERY started functioning as a junior college in September 1981 with the arrowed objective of providing higher education facilities to the young populations of the largely rural, socially and economically backward region comprising of Valanchery and surrounding villages. The college was upgraded as a degree college in 1991 and the postgraduate course M.Sc polymer chemistry was started in 1998.

The college has a record of consistent performance in curricular and extracurricular activities and unblemished history of trouble free campus. The peaceful campus and distinctly positive atmosphere provides the young scholars with right ambiance for intellectual pursuits. The college is an aided institution run by Muslim Educational Society affiliated to the University of Calicut and included under 2(f) and 12(b) of the UGC act. The college is accredited by NAAC with A grade (3.28).

## **ABOUT THE DEPARTMENT OF CHEMISTRY**

The department of chemistry came into existence in the year 1995 with the introduction of B.Sc polymer chemistry. The postgraduate course in polymer chemistry was started in 1998. The Department was elevated as research centre by University of Calicut in 2014 and FIST funding from Department of Science and Technology, Govt. of India sanctioned in the same year.

At present 36 seats are available for B.Sc and 10 seats for M.Sc course. Our college is one of the institutions where the University of Calicut first introduced both UG and PG courses in polymer chemistry. The faculty consists of 10 teaching members and three lab assistants. There are two well-equipped laboratories for M.Sc course and one for B.Sc course.

The Department is publishing a journal ChemY (Journal for Young Researchers in Chemistry) with ISSN 2394-1324.

**National Seminar**  
On  
**NEW VISTAS IN CHEMISTRY**  
**(NVC 2015)**

**1-2 December, 2015**



*Organized by*  
**RESEARCH AND POST GRADUATE DEPARTMENT OF CHEMISTRY**  
**MES KEVEEYAM COLLEGE VALANCHERY**  
**MALAPPURAM-KERALA**

*Sponsored by*  
**University Grants Commission**

## PREFACE

Chemistry as a science in its own right always supports and interacts with other scientific disciplines to make effective contribution to the solutions of problems facing the world today and to the improvement of the conditions of mankind tomorrow. Research and Post Graduate Department of Chemistry of MES Keveeyam College 'Valanchery organized a two day National Seminar on New Vistas in Chemistry (NVC 2015) which was aimed at generating enthusiasm among young researchers for a constructive and creative future of Chemistry. The event was indeed to provide a common platform for scientific interaction with young scientists and academicians in the new areas of chemistry and exploring the emerging areas of chemical research. The seminar, which was held at the AV Hall of the college, consisted of five invited lectures. It was attended by 100 students and teachers from different colleges.

We are thankful to University Grants Commission for providing the financial assistance for the seminar. We are extremely grateful to Dr. Edamana Prasad (Associate Professor, Department of Chemistry, IIT Chennai) who accepted our invitation and inaugurated the seminar. We are also thankful for his keynote lecture in the seminar. We extend our sincere thanks to Dr. S. Muthu subrahmaniam (Head, Department of Organic Chemistry, Madurai Kamaraj University, Tamilnadu), Dr. Kana M Sureshan (Associate Professor, IISER, Thiruvananthapuram), Dr. Vinayakan R (Asst. Professor, Department of Chemistry, Sree Vidyadhi Raja NSS College Vazhoor), Dr. Ananthakumar Solaiappan (Senior Principal Scientist, NIIST Thiruvananthapuram) and Dr. Parameswaran Pattiyil (Assistant Professor, Department of Chemistry, NIT, Calicut) for their valuable invited lectures in the seminar.

We are thankful to Dr. P. Mohamedali, Principal, M.E.S. Keveeyam College Valanchery for giving all the necessary guidance and support. We extend our thanks to Dr. Hussain K, Secretary and Correspondent, College Management Committee for his support. We also express our sincere thanks to all the faculty members, non teaching staff and students of the Department of Chemistry who worked as a team to make this seminar a grand success.

*P. A. Raziya*  
**P A Raziya**  
General Convener

*Dr. Preethy Alex*  
**Dr. Preethy Alex**  
Coordinator

## EXECUTIVE SUMMARY

A National seminar on “**New Vistas in Chemistry (NVC 2015)**” was organized under the aegis of Research and PG department of Chemistry, MES Keveeyam College, Valanchery on 1st and 2<sup>nd</sup> of December 2015. The seminar was intended to give an insight to students and teachers about the major areas in chemical research and expose them to the promising developments in chemistry. The seminar provided a platform for interaction among eminent scientists, faculty members, research scholars and students which facilitated the exchange of ideas. It helped the students to dedicate themselves to create high quality research in various meritorious institutions in India and abroad.

Dr.Edamana Prasad (Associate Professor, Department of Chemistry, IIT Chennai) inaugurated the seminar. The inaugural session was presided over by the Principal Dr. P Mohamedali. Dr. Kana M Sureshan (Associate Professor, IISER, Thiruvananthapuram), Prof. Manjula Raman and Prof. Shajid PP felicitated the function. Dr. Preethy Alex welcomed the gathering and Dr.C.Rajesh expressed the vote of thanks.

Six technical sessions were conducted in the seminar. In the first technical session on day one, Dr.Edamana Prasad (Associate Professor, Department of Chemistry, IIT Chennai) delivered a lecture on ‘Chemistry between Molecules’. In the second technical session Dr. S. Muthu subrahmaniam (Head, Department of Organic Chemistry, Madurai Kamaraj University, Tamilnadu) lectured on ‘Versatile applications of nuclear magnetic resonance techniques’. Dr. Kana M Sureshan (Associate Professor, IISER, Thiruvananthapuram) spoke about ‘Topochemical Reactions’ in the third technical session on the same day. Dr.Vinayakan R (Asst. Professor, Sree Vidyadhi Raja NSS College Vazhoor) was the invited speaker of the first technical session on day two. The topic of his talk was “Solar Cells”. Dr.

Ananthakumar Solaiappan (Senior Principal Scientist, NIIST, Thiruvananthapuram) talked about ‘Design of Gel derived Nanoporous architectures for Gas adsorption and Biomedical Applications’ in the second technical session of day two. Dr. Parameswaran Pattiyil (Assistant Professor, Department of Chemistry, NIT, Calicut) was the keynote speaker of the third technical session of the day and he talked about ‘Structure bonding and reactivity of singlet tetraenes’.

In the valedictory function, Mr. N Abdul Jabbar (District President, Muslim Educational Society) distributed the certificates for the delegates. Dr. P Mohamedali (Principal) presided over the function. Feedback from delegates was taken in the valedictory session.

The technical sessions of the seminar was conducted in the audio visual hall of the college. Faculty members and students from various colleges attended the seminar. The seminar was a success in providing an opportunity for the student and teacher community of our and nearby colleges to interact with eminent academicians and get acquaintance with the latest areas of research in chemistry.

## ORGANISING COMMITTEE

Patron	<b>Dr .Hussain K.</b> (Secretary and Correspondent, MES Keveeyam College)
Chairman	<b>Dr .P. Mohamedali</b> (Principal)
General Convenor	<b>Prof. P A Razyabi</b> (Head of the Department)
Coordinator	<b>Dr. Preethy Alex</b> (Associate Professor, Department of Chemistry)
Organising Secretary	<b>Dr.C.Rajesh</b> (Asst. Professor, Department of Chemistry)
Members	<b>Prof. K M Rukkiya</b> (Associate Professor) <b>Dr. Jisha VS</b> (Assistant Professor) <b>Prof. Minshiya P.</b> (Assistant Professor) <b>Dr. Saifunnisa TK</b> (Assistant Professor) <b>Prof. Jaseela MA</b> (Assistant Professor) <b>Prof. Nasiya N</b> (Assistant Professor)

### Proceedings Editorial Board

Prof. P A Razyabi (Editor)

Dr. C.Rajesh (Associate Editor)



# PROGRAMME

**1-12-2015, Tuesday**

**Inaugural Session (9.30 am -10.30 am)**

**Venue: AV Hall**

*Prayer* :

*Welcome* : Dr. Preethy Alex (Coordinator)

*Presidential Address* : Dr. Mohamedali P (Principal)

*Inauguration*

Dr. Edamana Prasad

(Associate Professor, Department of Chemistry, IIT Chennai)

*Felicitations*

- Dr. Kana M Sureshan (Associate Professor, Department of Chemistry, IISER Thiruvananthapuram)
- Prof. Manjula Raman (Former Head, Department of Chemistry)
- Prof. Shajid PP (Staff Secretary)

*Vote of thanks* : Dr.C.Rajesh (Organizing Secretary)

## **Session-I**

10.45-11.45 pm :

Dr. Edamana Prasad

(Associate Professor, Department of Chemistry, IIT Chennai)

*Topic:* Chemistry between Molecules

## **Session-II**

11.45-12.45

Dr. S. Muthu subrahmaniam

(Head, Department of Organic Chemistry, Madurai Kamaraj University, Tamilnadu)

*Topic:* ‘Versatile applications of nuclear magnetic resonance techniques’

12.45-1.30 pm: **Lunch Break**

## **Session-III**

1.30-3.30 pm

Dr. Kana M Sureshan

(Associate Professor, Department of Chemistry, IISER Thiruvananthapuram)

*Topic* : Topochemical Reactions

3.30-4.00: Paper presentation

**2-12-2015, Wednesday**

**Session-IV**

9.30-11.00 am :

Dr. Vinayakan R (Asst. Professor, Sree Vidyadhi Raja NSS College Vazhoor)

*Topic* : Solar Cells

11.00 -11.15am: Tea Break

**Session - V**

11.15-12.45 am

Dr. Ananthakumar Solaiappan

(Senior Principal Scientist, NIIST, Thiruvananthapuram)

*Topic:* Design of Gel derived Nanoporous architectures for Gas adsorption and Biomedical Applications

**Session - VI**

1.30 – 3.00 pm : Dr. Parameswaran Pattiyil

**Assistant Professor, NIT, Calicut**

*Topic:* Structure bonding and reactivity of singlet tetraenes

**Valedictory Session**

**Venue: AV- Hall**

*Prayer*

*Welcome* : Prof. K M Rukkiya

(Associate Professor, Dept. Of Chemistry)

*Presidential Address* : Dr. P Mohamedali (Principal)

*Valedictory address and distribution of certificates:*

Mr. N Abdul Jabbar (District President, Muslim Educational Society)

*Vote of Thanks:* Ms. Anjali Sherin (Secretary, Chemistry Association)

## *Technical Session I*

### **Dr.Edamana Prasad**

Associate Professor

Department of Chemistry, IIT Madras

pre@iitm.ac.in



#### **EDUCATION**

Early education from Calicut University, Kerala

MSc: SNGS PATTAMBI

Ph D (in the year 2000) from Kerala University working at National Institute of Interdisciplinary Science and Technology (NIIST, CSIR), Thiruvananthapuram, Kerala.

#### **POST-DOCTORAL RESEARCH ASSOCIATE**

Lehigh University, Bethlehem, Pennsylvania, USA with Professor Robert. A. Flowers II.

University of Texas Tech, Lubbock, Texas, USA with Professor Robert. A. Flowers II.

Alexander von Humboldt Fellow, Institute for Organic Chemistry and Biochemistry, University of Bonn, Germany with Professor Dr. Fritz Vögtle.

**2006 June-2012 July:** Assistant Professor, IIT Madras, Chemistry Department.

**2012 July-till to date:** Associate Professor, IIT Madras, Chemistry Department

#### **AWARDS**

2012: Young Faculty Recognition Award, IIT Madras

2002-2003 Alexander von Humboldt Fellow, **Alexander von Humboldt Foundation, Jean Paul Strasse-12, D-53173, Bonn, Germany.**

#### **AREA OF RESEARCH INTEREST**

Photophysics of Supramolecular Systems: **Structure Property Relation in Dendrimer based systems, Photoinduced Electron and Energy Transfer in self-assembled systems**

**Publications: (Over 40 )**

#### **RESEARCH GUIDANCE**

**Ph D Students currently working in the group: 12**

**Ph D Degree Awarded: 07**

# Chemistry between Molecules

(Dr. Edamana Prasad)

We have designed several dendron derivatives without conventional gelation motives to develop robust one, two and three component gel systems.<sup>1</sup> The present talk will summarize the recent results from our lab regarding the design, synthesis and photophysical studies of poly(aryl ether) dendron based fluorescent low molecular weight organo/hydro gelators containing acylhydrazone molecular loop. The results suggest that minute structural changes in the basic dendron units can have significant impact on the physico-chemical properties of the gel system. We have utilized the gel systems as (i) water purification, (ii) fluoride ion detection kit, (iii) self-assembled systems with tunable morphology and emission properties, (iv) phase selective gelation and (iv) host system for the synthesis and stabilization of nanotubes and nanoparticles. Details of the work will be presented.

## Reference

1. Neelakandan Vidhya Lakshmi\*, Thunga Madhu Babu and Edamana Prasad\* "Multi-Functional Materials through Self-Assembly of N-Alkyl Phenothiazine Linked Poly(Aryl Ether) Dendrons" Chem Commun. 2015 (accepted)
2. Thunga Madhu Babu and Edamana Prasad, Charge transfer assisted supramolecular 1-D nanofibers through a cholesteric structure directing agent: cooperative assembly design for supramolecular optoelectronic materials, Chem. Eur. J. 2015, 21, 11972
3. B. Vivek and Edamana Prasad, "Reusable Self-Healing Hydrogels Realized via In-Situ Polymerization", J. Phys. Chem. B, 2015, 119, 4881
4. Partha Malakkar and Edamana Prasad, "Self-Assembly and Gelation of Poly(aryl Ether) Dendrons Containing Hydrazide Units: Factors Controlling the Formation of Helical Structures", Chem. Eur. J., 2015, 21, 5093
5. Rajamalli, P.; Malakar, P.; Atta, S.; and Prasad, E. "Metal induced gelation from pyridine cored poly(aryl ether) dendrons with in situ synthesis and stabilization of hybrid hydrogel composites", Chem. Commun., 2014, 50, 11023



## *Technical Session II*

### **Prof S Muthusubramanian**

Head, Department of Organic Chemistry  
School of Chemistry  
Madurai Kamaraj University  
Madurai  
[muthumanian2001@yahoo.com](mailto:muthumanian2001@yahoo.com)

#### **EDUCATION**

M Sc	- V O C College, Tuticorin	1978
Ph D	- School of Chemistry, Madurai Kamaraj University	1984

#### **EMPLOYMENT**

Demonstrator, V O C College, Tuticorin	Sep 1978-Dec 1978
Assistant Professor, S R K V Arts college, Coimbatore	Jan 1983-Jan 1988
Lecturer, School of Chemistry, Madurai Kamaraj Univ	Jan 1988- Nov 1996
Reader, School of Chemistry, Madurai Kamaraj Univ	Nov 1996 - Nov 2001
Professor, School of Chemistry, Madurai Kamaraj Univ	Nov 2001 onwards

#### **TEACHING SPECIALISATION**

Organic synthesis, organic stereochemistry, organic spectroscopy, organic photochemistry, organic reaction mechanism

#### **RESEARCH INTEREST**

Synthesis of heterocyclic compounds, NMR spectroscopy for structure analysis

#### **RESEARCH PUBLICATIONS**

Published **186** research articles in well reputed journals of international status

#### **RESEARCH GUIDANCE**

Guided **sixteen** scholars and guiding **eight** scholars for their PhD  
Guided **thirty one** scholars for their M Phil and now guiding **one** scholar

#### **CONFERENCES ATTENDED**

Attended **hundred and twenty five** national level seminars/conferences/workshops

#### **RESEARCH PROJECTS OPERATED**

Operating/Operated major research schemes funded by different funding agencies

## Versatile Applications of Nuclear Magnetic Resonance Techniques

(S Muthusubramanian)

This lecture is to highlight the prime applications of NMR spectroscopy for the structure analysis of organic compounds. This lecture will also cover the advanced techniques that can be used to a) resolve signal overlap b) detect overlapping signals c) assign signals unambiguously d) to establish all bond connectivities between nuclei, either hetero or homo, either through bond or through space and e) to ascertain the three dimensional structure of the molecule. In a nutshell, the structural features of any organic molecule, whether synthesized or isolated from natural sources, can be easily solved with one and two dimensional NMR techniques. Even the structural features of complex biomolecules are comfortably solved with this of technique. The application of NMR phenomenon for diagnostic purposes and material studies will also be highlighted.

### *Technical Session III*

#### **Dr.Kana M Sureshan**

School of Chemistry

Indian Institute of Science Education and Research Thiruvananthapuram

Thiruvananthapuram-695016 (Kerala), INDIA

Email: [kms@iisertvm.ac.in](mailto:kms@iisertvm.ac.in)



#### **Education and Experience**

1. 2008-2009 : Senior Scientist , Institute of Life Sciences, Hyderabad.
2. 2006-2008 : AvH Post Doctoral Fellow : Department of Chemical Biology, Max-Planck Institute for Molecular Physiology, Dortmund, Germany.
3. 2004-2006 Research Officer : Department of Pharmacy and Pharmacology, University of Bath, BATH, BA2 7AY, UK.
4. 2002-2004 : JSPS Post-Doctoral Fellow : Faculty of Engineering, Ehime University, Japan.
5. Ph.D National Chemical Laboratory, Pune, India.

#### **Research Areas**

1. Asymmetric Catalysis: Development of novel asymmetric catalysts and their use in asymmetric organic transformations
2. Supramolecular Chemistry: Exploiting various non-covalent interactions for design of functional and advanced materials
3. Natural Product Synthesis: Synthesis of various natural products of biological importance
4. Methodology Development: In this area, we are interested to develop novel organic transformation strategies, novel protecting groups etc.

#### **Achievements**

1. Ramanujan Fellowship, DST, Govt of India (2010)
2. Cash award (20,000.00 US Dollars) for solving an innocent challenge (InnoCentive 5636748) for designing the shortest and economical route to PA-824, a candidate drug for tuberculosis (2008).
3. Alexander von Humboldt Fellowship (2006-2008).
4. JSPS Post-Doctoral Fellowship for Foreign researchers (2002-2004).
5. Senior Research Fellowship of CSIR (Council of Scientific and Industrial Research), New Delhi, Govt. of India (1999-2002) .
6. EDITORIAL BOARD MEMBER of the International Journal OPEN GLYCOSCIENCE (from 2008)
7. Invited to be a GUEST EDITOR for an issue of the International journal CURRENT BIOACTIVE COMPOUNDS

Publications (Over 60 publications in reputed international journals)

# Topochemical Reactions

(Dr. Kana M Sureshan)

Topochemical reactions, the reaction between preorganized reacting motifs in the crystal lattice, are attractive not only because they provide basic understanding about mechanistic and geometrical details about a reaction, but also they constitute perfectly green chemical method as they avoid solvents, catalysts and other special reaction conditions.<sup>1</sup> Due to the restricted mobility in the crystalline state, close proximity and proper orientation of the reacting motifs in the crystal lattice are important pre-requisites for a topochemical reaction to occur.<sup>2</sup> The design of topochemical reactions constitute a difficult task owing to the inherent difficulty in designing a crystal structure with such fine control.<sup>3</sup> Especially more difficult is the design of bimolecular topochemical reaction between non-identical partners due to the difficulty in cocrystallization of two components with predesigned packing.<sup>4</sup> We have observed a lattice controlled spontaneous regiospecific topochemical azide-alkyne cycloaddition of a monosaccharide analogue to provide the 1,5-triazolyl linked linear oligosaccharide analogues (pseudostarches), which are otherwise difficult to synthesize *via* the conventional solution state chemistry.<sup>5</sup> Also, we have topochemically synthesized stereoregular, monodisperse glycopolymers,<sup>6</sup> DNA analogs<sup>7</sup> and peptides by applying the principles of crystal engineering. Pursuing our interests in organogels<sup>8-10</sup> and topochemical reactions,<sup>5-7,11</sup> for the first time, we have designed and executed a thermal topochemical reaction between two non-identical organogelators decorated with complimentary reacting motifs *viz* azide and alkyne by preorganising them through their coassembly in their bicomponent gel.<sup>12</sup> The success of our design illustrates the fidelity of the supramolecular chemistry approach to find solutions to such problems.

## References:

- 1 (a) *Photochemistry in Organized and Constrained Media*, ed. V. Ramamurthy, VCH Publishers, New York, 1991; (b) K. Tanaka and F. Toda, *Chem. Rev.*, 2000, **100**, 1025.
- 2 G. M. J. Schmidt, *Pure. Appl. Chem.*, 1971, **27**, 647.
- 3 J. D. Dunitz, *Chem. Commun.*, 2003, 545.
- 4 J. H. Kim, S. V. Lindeman and J. K. Kochi, *J. Am. Chem. Soc.*, 2001, **123**, 4951.
- 5 <sup>A</sup> Pathigoolla, R. G. Gonnade and K. M. Sureshan, *Angew. Chem. Int. Ed.*, 2012, **51**, 4362
- 6 <sup>A</sup> Pathigoolla and K. M. Sureshan, *Angew. Chem. Int. Ed.*, 2013, **52** 8671.
- 7 <sup>A</sup> Pathigoolla and K. M. Sureshan, *Angew. Chem. Int. Ed.*, 2014, **53**, 9522.
- 8 A. Vidyasagar, K. Handore and K. M. Sureshan, *Angew. Chem. Int. Ed.*, 2011, **50**, 8021.
- 9 K. M. Sureshan, K. Yamaguchi, Y. Sei and Y. Watanabe, *Eur. J. Org. Chem.*, 2004, 4703.
- 10 A. Prathap and K. M. Sureshan, *Chem. Commun.*, 2012, **48**, 5250.
- 11 K. M. Sureshan, T. Murakami, T. Miyasou and Y. Watanabe, *J. Am. Chem. Soc.*, 2004, **126**, 9174.
- 12 B. P. Krishnan, S. Ramakrishnan, K. M. Sureshan, *Chem. Commun.* 2013, **49**, 1494.



## *Technical Session IV*

### **Dr. Vinayakan**

Assistant Professor of Chemistry  
Sree Vidyadhi Raja (SVR) NSS College Vazhoor  
T. P. Puram (PO), Kottayam - 686505



### **Education**

PhD (CUSAT, Work done at: Photosciences and Photonics, NIIST, Trivandrum) (2010)  
UGC - JRF (NET) (2004)  
GATE (97.8, All India Rank 69) (2004)

Post-Doctoral Research Fellow, Cornell University, NY, USA (2014-15)

**Research Interests:** Nanomaterial based Biosensing, Bioimaging, Photovoltaics etc.

### **Projects**

UGC, Govt. of India Minor Research Project on QD Synthesis (1.25 lakhs) (Completed).  
UGC Major Research Project (13 lakhs) (Co-Investigator, 2011-14). UGC Minor Research Project (1.6 lakhs) (Co-Investigator, 2012-13)

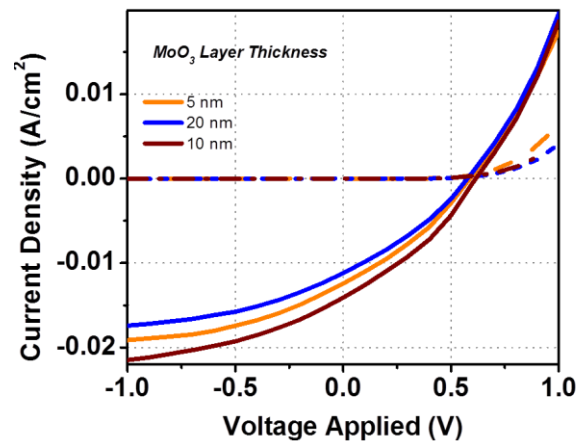
**International Publications:** 8

**Patents:** 1

# Solar Cells

(Vinayakan )

Hereby we demonstrate nanocrystal heterojunction photovoltaic structures with high reproducibility by simple processing techniques are under ambient conditions. Oleic acid capped PbS Quantum Dots were synthesized *via* standard literature procedures. Device fabrication and testing was performed under ambient conditions. QDs were dissolved in chlorobenzene (40 mg/mL) and filtered (0.2  $\mu\text{m}$  PTFE). The zinc oxide (ZnO) layer (20 nm thickness) was deposited by sputtering on patterned ITO substrates. QD films were deposited by three cycles of sequential spin-casting, leading to a final thickness of  $\sim 100$  nm. After each spin coating cycle, 1 mL of 0.1 M 1,2-Ethane dithiol in acetonitrile was swiftly dispensed on QD film, left for 30 s, and then spun. Immediately, the layer was rinsed with acetonitrile and finally with chlorobenzene, before proceeding to next QD layer deposition. The molybdenum trioxide and gold films are deposited via thermal evaporation. The current density-voltage (J-V) measurements for four various device areas (9, 16, 25 and 50  $\text{mm}^2$ , defined by the anode cathode overlap) were recorded by a Keithley 236, illuminated by a Solar Light 16S-002 solar simulator equipped with an AM1.5G filter.



## *Technical Session V*

### **Dr Ananthakumar S**

Senior Principal Scientist  
National Institute of Interdisciplinary Science and Technology,  
Thiruvananthapuram



Dr.S.Ananthakumar joined in CSIR career as Scientist since April 1992 and has been associating with Materials and Minerals Division of NIIST. He has more than 15 years of service in CSIR and actively involved in ceramic materials and composites research. During the initial period of his career, he worked in the area of microwave processing ZnO varistors, evaluation of mechanical properties of sol gel derived alumina nano abrasives. Later he took Ph.d in composite fabrication through sol gel assisted ceramic extrusion. He has hands on experience in fabrication of fine grained alumina, mullite and aluminiumtitanate ceramic nano composites and evaluation of their mechanical properties. Presently he is a project leader for two projects (i) Development of high energy field varistors sponsored by a private industry and (ii) Rare earth oxide varistors sponsored by M/s IRE, Kollam.

#### **Professional Record**

2008 – 2010	Scientist -EII, Nano-Ceramics Division
2001 – 2008	Scientist -EI, Nano-ceramic Division
1997 – 2001	Scientist- C, Structural Ceramics Division
1992 – 1997	Scientist -B, Particulate Ceramics Division

#### **Academic Qualifications**

Ph.D	Ceramic Engineering, Anna University, Chennai
M.Tech	Ceramic Technology, Anna University, Chennai
B.Tech	Chemical Engineering, Anna University, Chennai

#### **Post Doctoral research**

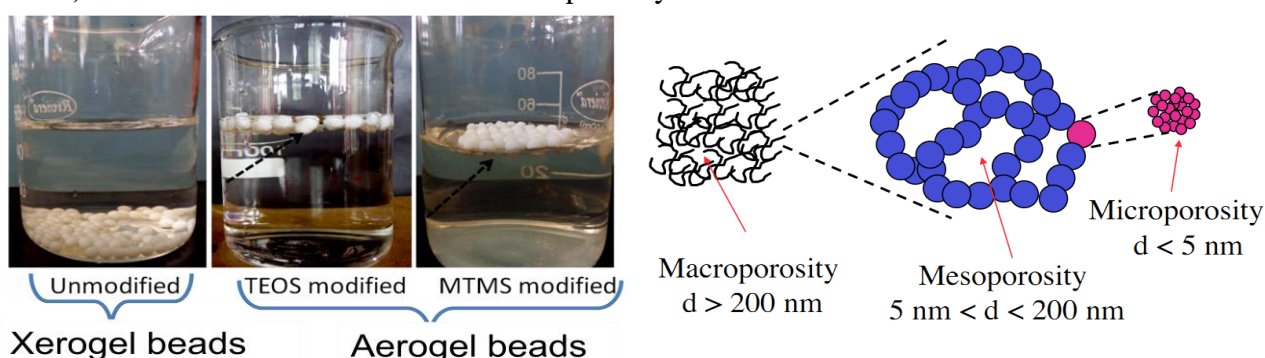
Development of nanostructured Zn-Sb Intermetallic thermoelectric materials through wet chemical synthesis at Institute Charles Gerhardt, Université Montpellier II, Physicochimie des Matériaux Organisés Fonctionnels, Montpellier, Cedex 5-France.

#### **Professional Achievements**

Research Publications – 60  
Ph.d Research works – 2 (on going)  
M.Tech / MSc Projects – 20  
Book Chapter – 1

## Design of gel derived nanoporous architectures for gas adsorption and bio medical applications (Ananthakumar S)

Alumino-siloxane aerogel is a promising, porous host matrix because of its open structure and multifunctional characteristics. Granulation of aerogel spheres is a challenging job and we identified a new aqueous sol-gel process for developing hierarchically porous hybrid aerogel ceramic media using organofunctional silanes (APTMS, VTMS) and aluminium alkoxide (ALISOP) reactants. Role of structure directing co-block polymer (P-123) was studied to reach the hierarchical porosity.



In this talk, the textural properties of hybrid aerogels, chemical bonding, morphology, wettability of the aerogel media were discussed. The experimental results revealed that the aerogel beads possess hydrophobic and hydrophilic functionalities, interconnected hierarchical meso/nano porosities. Aminated alumino-siloxane hybrid gel was first prepared via sol-gel technique using aluminium isopropoxide [ALISOP] and aminopropyl trimethoxy silane (APTMS). The gel was characterized for rheology at different shear rates with varying amounts of APTMS. Interestingly, a rare 'reversible thixotropic' phenomenon was noticed for the first time in aminated alumina gels. Thixotropically reversible hybrid gel was subsequently converted to hydrogel microspheres via nanoassembly process, followed by surface modification and ambient pressure drying to prevent the collapse of the transient hybrid porous network resulted in open porous aerogel framework. tetraethylorthosilicate (TEOS) and methyltrimethoxysilane (MTMS) were employed for surface modification to obtain altered surface wetting properties.

Aerogel microspheres were found to have three times superior surface area compared to their xerogel counterparts calcined at identical calcinations conditions. The study has significance because such aerogel microspheres have possible industrial applications in the fields of asymmetric membrane, immobilization, extraction, separation science, and catalysis.

## *Technical Session VI*

### **Pattiyil Parameswaran**

Department of Chemistry,  
National Institute of Technology Calicut  
Kozhikode, Kerala, India - 673 601  
Tel: 0091-495-228-5304, Fax: 0091-495-228-7250  
*param@nitc.ac.in*



Ph. D. in Chemistry, School of Chemistry, University of Hyderabad, India.  
Thesis Title: “Theoretical Studies on Three Membered Rings and Organometallic Complexes”.  
Supervisor: Prof. E. D. Jemmis  
(March, 2007).

M. Sc. Chemistry, St. Thomas’ College, Thrissur, University of Calicut (1998-2000)

B. Sc. Chemistry, St. Thomas’ College, Thrissur, University of Calicut (1995-1998)

#### Research Interests

1. Coordination chemistry at the main-group elements
2. Designing of ligands and catalysts
3. Computational Biomimetic Catalysis
4. Computational nano-materials

27 publications

Fellowships/Honors

- Alexander von Humboldt Alumini Fellowship
- Japan Science and Technology-Postdoctoral Research Fellowship (JST), Fukui Institute for Fundamental Chemistry, Kyoto University (2009-2010)
- Alexander von Humboldt (AvH) Fellowship, Bonn, Germany (2007-2009)
- DST-DAAD Exchange Program Fellowship (2006)
- Junior/Senior Research Fellowship from CSIR
- Qualified Joint CSIR-UGC JRF/Eligibility for Lectureship Examination (December, 1999; June, 2000)
- Qualified Graduate Aptitude Test for Engineering (GATE) (2000)

## Chemistry with Computers: What and How?

(P Parameswaran)

Singlet carbenes and its heavier analogues (tetrylenes) have been playing a pivotal role in all branches of chemistry. The singlet tetrylenes stabilized by heteroatom substitution are commonly observed as compared to the non-heteroatom-substituted analogues. The reactivity of tetrylenes is mainly governed by the  $\sigma$  type lone pair and the vacant p orbital on the di-coordinated divalent group 14 elements (E). However, reports on the diverse reactivities of tetrylenes such as C–N bond cleavage, ring expansion reactions, group 14 atom displacement reactions, ambiphilicity, betaine-type reactivity and difference in the reactivity of the heavier analogues as compared to carbenes cannot be explained by the conventional electronic structure of tetrylenes. The detailed analysis of the structure, bonding and reactivity study of five and six membered N-heterocyclic singlet tetrylenes will be presented.

## Paper Presentations

### An Eco-friendly method for the synthesis of 3, 4 dihydropyrimidinones using Zirconium doped Montmorillonite clay catalysts

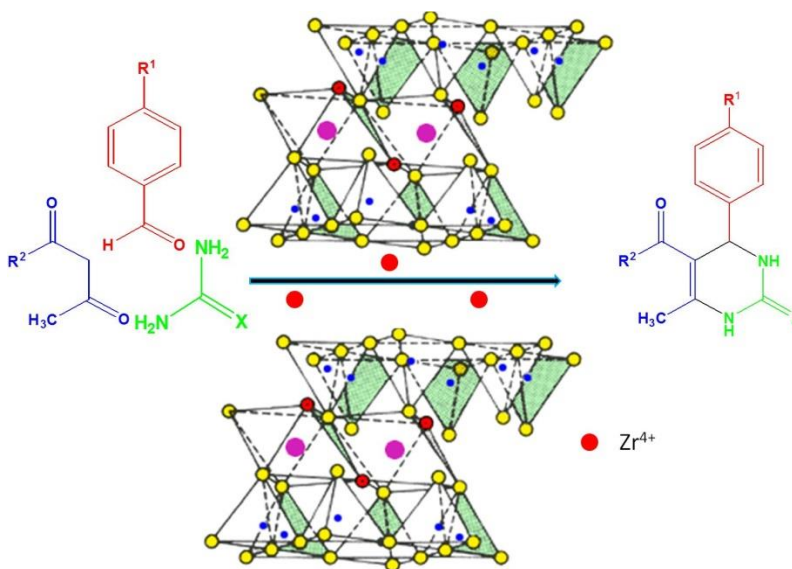
**Divya. P. Narayanan, Binitha. N. Narayanan**

*<sup>a</sup>Department of Chemistry, Sree Neelakanta Govt. Sanskrit College Pattambi, Kerala, India*

*Email: [divyavengad07@gmail.com](mailto:divyavengad07@gmail.com)*

#### ABSTRACT

Biginelli reaction, which involves the synthesis of 3, 4 dihydropyrimidinones employing multicomponent one pot condensation reaction between benzaldehyde, dicarbonyl compound and urea in the presence of eco-friendly and efficient zirconium doped Montmorillonite clay catalysts, is performed under solvent free condition. Different percentage of zirconium doped Montmorillonite clays were prepared by simple impregnation method. In order to find out the active phase responsible for catalytic action, the prepared catalytic systems were characterized using different techniques. The present methodology offers several merits such as excellent yield, easy work up, shorter reaction time, reusability of the catalyst, environmental friendly reaction conditions etc.



## Scheme 1. Biginelli reaction over n%Zr/Mont.K10

### Synthesis of Biodiesel from Waste Cooking Oil with Silica-Supported KOH Catalysts

**Sudha Kochiyil Cherikkallinmel and Binitha N Narayanan**

*Department of Chemistry, SreeNeelakanta Government Sanskrit College*

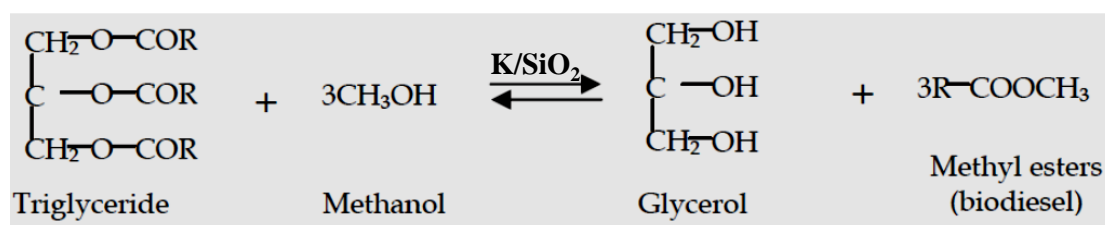
*Pattambi, Palakkad-679306, Kerala, India*

*Ph: +91 466-2212223. Fax: +91 466-2212223,*

*[sudha.kc04@gmail.com](mailto:sudha.kc04@gmail.com)*

#### Abstract

A series of KOH catalysts supported on commercial silica have been prepared by incipient wet impregnation method and their activity tested in the transesterification reaction of refined waste cooking oil with methanol. The catalyst is characterized by different techniques. The effects of the methanol/oil molar ratio, catalyst amount, KOH loading, reaction temperature, reaction time and calcination temperature of the supported catalysts have been investigated to get the optimum condition for maximum conversion. Highest FAME yield of 99.95% is obtained under optimal reaction conditions. The prepared system has the advantages of operational simplicity, mild reaction conditions, low reaction time with high conversion.



Scheme 1. Transesterification of waste cooking oil over K/SiO<sub>2</sub>



## **Polymer Solar Cell**

**Mohamed Rafeeqe K C<sup>1</sup> and Deepak M.V<sup>2</sup>.**

<sup>1</sup>Department of Chemistry, IIT Kharakpur

<sup>2</sup> Department of Chemistry, MES Keveeyam College Valanchery, Kerala, India  
mvgopideepak@gmail.com

### **Abstract**

A Polymer solar cell is a type of flexible solar cell made with polymers ,that produce electricity from sunlight by the photovoltaic effect.The most commercial solar cells are made from a refined,highly purified silicon crystal,similar to the material used in the manufacturing of integrated circuits and computer chips(wafer silicon).Compared to silicon-based devices,polymer solar cells are light weight , potentially disposable and inexpensive to fabricate,flexible,customizable on the molecular level and potentially have less adverse environmental impact.Polymer solar cells also have the potential to exhibit transparency,suggesting applications In windows,walls,flexible electronics,etc.In this review we discuss about the modern techniques for making efficient polymer based PV [photovoltaic] devices also providing a synopsis of major achievements in the field over the past few years.

## **Novel Methods of Cellulose and Cellulosic Modification**

**Mohamed Arif CP<sup>1</sup> and Anuroopa C<sup>2</sup>**

- <sup>1.</sup> Govt. Engineering College, Thiruvananthapuram, Kerala
- <sup>2.</sup> Department of Chemistry, MES Keveeyam College Valanchery, Kerala, India

*rykaruhi@gmail.com*

This work was aimed to evaluate the recent progress in the synthesis of cellulose and modification in cellulose. Using different techniques or treatment results in numerous structural modification, causing changes of their accessibility and/or reactivity. Natural cellulose fibers based materials are finding their application in a number of fields ranging from automotive to biomedical. Natural cellulose fibers have been frequently used as the reinforcement component in polymer to add the specific properties in the final product. A variety of cellulose fibers based polymer composite materials have been developed using various synthetic strategies. The prime aim of this review article is to demonstrate the recent development and emerging application of natural cellulose fibers and their polymer materials.

## Conducting Polymers

Sreejith MP<sup>1</sup> and Ummu Habeeba O<sup>2</sup>

1. Department of Chemistry, University of Calicut, Kerala
2. Department of Chemistry, MES Keveeyam College, Valanchery, Kerala

### Abstract

Conducting polymers represent an important class of functional organic materials for next generation electronic and optical devices. Advances in nanotechnology allow for the fabrication of various conducting polymer nanomaterials through synthesis methods such as solid phase template synthesis, molecular template synthesis and template free synthesis. Nanostructured conducting polymer featuring high surface area, small dimensions and unique physical properties have been widely used to build various sensor devices. Many remarkable examples have been reported over the past decade. The enhanced sensitivity of conducting polymer materials towards various chemical or biological species and external stimuli has made the ideal candidate for the design of sensors.

## Polymer Liquid Crystal

Sadiquali CT<sup>1</sup> and Huda.E.Hasan<sup>2</sup>

1. Department of Chemistry, SNDP College Perinthalmanna, Kerala
2. Department of Chemistry, MES Keveeyam College, Valanchery, Kerala

*huda.e.hasan@gmail.com*

### Abstract

A relatively unique class of partially crystalline aromatic polyesters based on p-hydroxy benzoic acid and related monomers. Liquid crystal polymers are capable of forming regions of highly ordered structure while in the liquid phase. However, the degree of order is somewhat less than that of a regular solid crystal. Typically liquid crystal polymers have outstanding mechanical properties at high temperature, excellent chemical resistance, inherent flame retardancy and good weatherability. Liquid crystal polymers come in a variety of forms from sintered high temperature to injection moldable compounds.

## **Super Absorbent Polymers**

**Deepa<sup>1</sup> and Ishrath Raihanath V.M<sup>2</sup>**

- <sup>1.</sup> Department of Chemistry, Unity Women's College Manjeri, Kerala
- <sup>2.</sup> Department of Chemistry, MES Keveeyam College, Valanchery, Kerala  
vmishrath@gmail.com

### **ABSTRACT:**

This article briefly describes the general aspects and cross-linking polymerization of superabsorbent polymers (SAPs). Superabsorbent polymer (SAP) materials are hydrophilic networks that can absorb and retain huge amounts of water or aqueous solutions. This article reviews the SAP literature, background, types and chemical structures, physical and chemical properties, testing methods, uses, and applied research works.

## Bio Medical Applications Of Hydrogels

Abdul Rahman MK<sup>1</sup> and Maimoonath <sup>2</sup>

1. Department of Chemistry, MET College, Nadapuram, Kerala
2. Department of Chemistry, MES Keveeyam College, Valanchery, Kerala  
aliniyuI43@gmail.com

### ABSTRACT

Hydrogels are three dimensional, hydrophilic , polymeric networks capable of imbibing large amounts of water or biological fluids. The networks are composed of homo polymers or copolymers , and are insoluble due to the presence of chemical crosslinks or physical cross links, such as entanglements or crystallite. The latter provide the network structure and physical integrity. These biomaterials have gained attention owing to their peculiar characteristics like swelling in aqueous medium, P<sup>H</sup> and temperature sensitivity or sensitivity toward other stimuli. Hydrogels being biocompatible materials have been recognized to function as drug protectors, especially for peptides and proteins from *in-vivo* environment. Which are used for the chemotherapeutic agents for tumors. Also these swollen polymers are helpful as targetable carriers for bioactive drugs with tissue specificity. Hydrogels are presently under investigations as a delivery system for bio active molecules, because of their similar physical properties as that of living tissue, which is due to their high water content, soft and rubbery consistency, and low interfacial tension with water or biological fluids. Synthetic polymer hydrogels constitute a group of materials, used in numerous biomedical disciplines, and are still developing for new promising applications. The aim of this study is to review information about well known and the newest synthetic hydrogels and show the biomedical applications of each such as tissue engineering, wound dressing ,drug delivery. hygienic product, contact lenses etc.

# Biomedical Application Of Thermally Activated Shape Memory Polymer

Baiju<sup>1</sup> and Naseeba K K<sup>2</sup>

- <sup>1.</sup> Department of Chemistry, IISER, Thiruvananthapuram, Kerala
- <sup>2.</sup> Department of chemistry, MES Kveeyam College Valanchery, Kerala, India  
naseeba.saleem@gmail.com

## ABSTRACT

Shape memory polymers (SMP) are lightweight, have a high strain/shape recovery ability, are easy to process, and required properties can be tailored for variety of applications. Recently a number of medical applications have been considered and investigated. SMP materials were found to be biocompatible, non-toxic and non-mutagenic. The glass transition temperature ( $T_g$ ) can be tailored for shape restoration/self-deployment of clinical devices when inserted in the human body. Newly developed SMP foams, together with cold hibernated elastic memory (CHEM) processing, further broaden their potential biomedical applications. Some SMP applications are already used in a clinical setting, whereas others are still in developments.

# Nano Biosensors

Mohanakrishnan<sup>1</sup> and Naseeba VT<sup>2</sup>

1. Department of Chemistry, NSS College Ottappalam, Kerala
2. Department of Chemistry, MES Keveeyam College Valanchery, Kerala, India

## ABSTRACT

Nanotechnology is a new branch of science that deals with generation and alteration of materials to nano size. This play an important role in the developement of biosensors. The sensitivity and performance of biosensors are improved by using nanomaterials through new signal transduction technologies. The use of nanotechnology in biosensors has led to the development of biosensors that interact with extremely small molecules that need to be analysed. As nanotechnology become more refined and reliable, it will eventually make lab on a chip devices for rapid screening of wide variety of analysis at low cost. Nanomaterials used such as gold nanoparticles, magnetic nanoparticles and quantum dots are investigated for their applications in biosensors. This paper reviews that the status of various nanobiosensors.



# Application of Silicon Polymers In Artificial organs

Sunil Kumar M<sup>1</sup> and Raihanath T<sup>2</sup>

- <sup>1.</sup> Department of Chemistry, National Institute of Technology, Calicut, Kerala
- <sup>2.</sup> Department of Chemistry, MES Keveeyam College Valanchery, Kerala, India

## Abstract

Silicones, with their unique material properties ,have found wide spread application in health care. Properties attributed to silicone include *biocompatibility* and *biodurability*, which can be expressed in terms of other material properties such as hydrophobicity, low surface tension, and chemical and thermal stability. These properties are the basis for silicone`s initial use in the medical field.

## **Dendritic Polymers**

**Harikrishnan<sup>1</sup> and Sareena C.Y<sup>2</sup>**

- <sup>1.</sup> Department of Chemistry, Newmans College Thodupuzha, Kerala
- <sup>2.</sup> Department of Chemistry, MES Keveeyam College Valanchery, Kerala, India  
sareenacy@gmail.com

### **ABSTRACT**

The dendritic polymers are a new class of polymeric materials. They are highly branched, monodisperse macromolecules. Dendritic polymers, more specifically dendrimers are repetitively branched molecules. The properties of dendrimers are dominated by the functional groups on the molecular surface. In this paper the synthesis, uses and applications of dendritic polymers are included.

## **Self-healing polymeric materials : Recent developments**

**Mehr Ul Minnath<sup>1</sup> and Fathima Shahna K.P<sup>2</sup>**

<sup>1.</sup> Department of Chemistry, MES Mambad College, Mambad, Kerala

<sup>2.</sup> Department of Chemistry, MES Keveeyam College Valanchery, Kerala, India

fathimashahna4u.fs.fs@gmail.com

### **ABSTRACT**

Self- healing was put forward to cope with slight damages in polymer materials which are difficult to detect. Self-healing materials have made considerable progress in recent years. It become a good research in both polymer science and material science. It can extend the working life and safety of the polymeric components for a broad range of application. With polymers and composites being increasingly used in structural application in air craft , cars , ships ,defence and construction industries ,several technique have been adopted by industries for repairing detectable damages on polymeric structures.

## PHOTO GALLERY

