

NEWSLETTER
of
THE MUMBAI REGIONAL CENTRE
INDIAN INSTITUTE OF CHEMICAL ENGINEERS
(www.iichemrc.org)

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Editorial

One of the most conspicuous things about our two-day symposium on Nanotechnology, held in the last week of May, was the preponderance of youth among the audience. This augurs well for our profession. This enthusiastic participation by youth in our all activities was indeed the main focus of this year's Executive Committee, which lays down office on 30th June after a very successful year of innovative programmes. Another noteworthy feature about this symposium was the collaborative effort that went into organising it – collaboration between our institute and a fundamental research body like TIFR and also collaboration between chemical engineers and chemists, the latter through the participation of the Indian Science Congress Association. As if this was not enough, the event also witnessed another unique collaborative effort between Mumbai and Baroda centres of our Institute by simultaneously holding the symposium at two geographical locations and live videoconferencing of the proceedings at the other venue.

This infectious spirit of collaboration and co-operation was again evident in abundant measure just a few days ago, as another neighbouring regional centre at Lote organised a factory visit cum picnic for members of our centre, which included a healthy mix of students and faculty. Exchange of technical ideas and sharing institute related information was part of this enjoyable visit. Such collaborative programmes are examples worthy of emulation by other regional centres of our Institute.

K.Sahasranaman

Chairman's Message

Dear Fellow Chemical Engineers,

As the term of the present Executive Committee draws to a close, I wish to place on record my sincere appreciation of the great team work during the year.

Our programmes this year, about which I have written in my earlier messages, have succeeded in drawing the interest and participation of the younger chemical engineers. The last event, a seminar on 'Nanotechnology - Perspectives and Prospects', was truly a grand finale. MRC had the support of TIFR and Indian Science Congress Association Mumbai Chapter in organising the seminar on a subject that holds enormous potential.

India missed an early entry into the semiconductor revolution a few decades ago. Others like Japan invested early and reaped the benefits by becoming a major global force in the electronics business that emerged. Now an opportunity has come our way in the area of nanotechnology. We be it academia, research institutions, industry or the Government need to seize it fast and invest time and resources in all areas of endeavour.

We therefore decided to focus the thoughts of an enlightened group of chemical engineers from industry and academia on nanotechnology with the confidence that it would initiate a chain reaction. We were fortunate to have Dr. Vijay Khole VC, Mumbai University, Dr. S. Banerjee Director BARC, Mr. Mukesh Rohatgi CMD EIL, Dr. Shobo Bhattacharya Director TIFR, Prof G. D. Yadav, HOD Chemical Engineering, UICT to convey their vision at the inaugural session. Whereas in the final session, we had the benefit of Prof. Ashok Misra's experience at IIT-Bombay in incubation of new businesses in cutting edge technologies.

Nanoscience and nanotechnology involves studying and working with matter on an ultra-small scale. One nanometre is one-millionth of a millimetre and a single human hair is around 80,000 nanometres in width. It is a broad and interdisciplinary area of research and development activity that has been growing exponentially in the past few years. It is widely recognised as having potential benefits in areas as diverse as drug development, water decontamination, information and communication technologies and the production of stronger but lighter materials

Chemical engineers are very much involved in nanotechnology. Areas of Research include colloid and interfacial engineering, membranes and membrane separations, self assembly and self organisation and bio-surface engineering. Chemical engineering is applied in the development of carbon nanotubes, nanowires, nanodots; self-organised assembly of polymer mesostructures for optoelectronic sensor and energy applications, mesoporous materials for low dielectric and energy storage applications, polymeric and ceramic nanocomposites, nanoporous silica for high density magnetic recording, sol-gel engineering of thin films, nanocrystalline silica and other coatings, magnetic nanoparticles, nanomechanics including adhesive joints and soft coatings. Chemical

engineering concepts are also involved in drug delivery and formulation of nanoparticles, liposomes, micro engineering of biomembranes and microstructured fluids.

With leading institutions like IChE, TIFR and ISCA as organisers, over 15 experts sharing their findings and views, witnessed and appreciated by more than 200 delegates from all over the country gathered simultaneously at Mumbai and Baroda interconnected in videoconference mode, the seminar was unique in more ways than one. Details are reported in a separate article in this Newsletter. I am hopeful that this seminar will spur beneficial research and emergence of entrepreneurial activity that would result in a clear strategic economic advantage for our country.

Wishing you Good luck & God bless,

K.Venkataramanan

Report on

International Seminar on “Nanotechnology - Perspectives & Prospects”

Organised by IChE MRC in association with TIFR & ISCA

TIFR Lecture Hall, 25-26 May 2006

At the two-day Seminar on “Nanotechnology – Perspectives & Prospects”, co-organised by Indian Institute of Chemical Engineers Mumbai Regional Centre, along with the Tata Institute of Fundamental Research and Indian Science Congress Association, world renowned scientists enlightened the audience, especially our young minds, on Nanotechnology, a science that has come into its own and is arguably the biggest buzzword in scientific circles today. An especially unique feature of the event was a live participation by the IChE Baroda chapter in a videoconferencing mode.

The ball was set rolling at the inaugural session by the welcome address of K. Venkataramanan -Chairman, IChE MRC and President - Operations of L&T in a videoconference mode. Dr. Vijay Khole -Vice Chancellor, Mumbai University, delivered the Inaugural Address while Dr. S. Banerjee –Director, BARC, delivered the Key Note address. He was followed by Dr. S. Bhattacharya –Director, TIFR who briefed the audience on the immense potential in this multidisciplinary activity and Prof G. D. Yadav –HOD, Chemical Engineering Dept. MUICT who elaborated on the role of Chemical Engineers in the development of nanotechnology and stressed on the need to integrate nanotechnology into engineering and science curriculum. A highlight of the event was a Poster Competition inaugurated by Mukesh Rohatgi – CMD, EIL.

K. Sahasranaman, Uhde India Ltd, chaired the preliminary session on ‘Nanotechnology at Work’ with talks by Mr. V. M. Naik –VP R&D Unilever and Dr. Arup Chatterjee, Technical Director - United Nanotechnologies. Mr. Naik talked about the first

nanoemulsion, Fair & Lovely, which was a runaway success and the role of functional nanostructures in the world of Fast Moving Consumer Goods. Dr. Chatterjee emphasised on developing an indigenous Fuel Cell for hydrogen storage. He displayed a few samples in which waterproof nanosilica coating were used for automobile as well as construction industries.

The next session on Nanocatalysis was chaired by Professor Periaswamy, HOD, Chemical Sciences, TIFR. In this session, Dr. Lakshmi Kantam, IICT, spoke about the extensive nanocatalysts contributed by her group with proven efficacy in a number of industrially important reactions. Dr. Eric Van Capellen, FEI, USA, spoke about the tools available for the characterisation of nanocatalysts. With movie clips incorporated into his talk, the complex subject was made extremely lucid and well received by the audience. Dr. R. Krishnamurthy delivered the first videoconferencing lecture for the Mumbai audience from the Baroda venue on the impact of nanocatalysts on the chemical industry.

Nanocomposites was the next session for discussion chaired by Prof. M. B. Kurup, Dean TIFR . Dr. Amit Biswas, RIL briefed the audience on the development of polymer nanocomposites as a new class of polymeric materials which combine extraordinary performance and other desirable functional properties with affordability. He highlighted recent advances in this area which are likely to provide solutions to the challenging material requirements of the 21st century. Prof. Ayyub of TIFR illustrated various techniques of nanomaterial synthesis with typical examples and emphasised on the modification of important physical properties through a proper control over the particle size and shape. The day closed with Dr. G. N. Mathur -Ex-Director, DMSRDE, sharing his extensive experience on various shapes, size and geometries of carbon nanotubes with the audience.

Day two of the event was kicked off by Dr. Ganeshan, TEIL, chairing the session on Nanobiotechnology. This is one area which has seen a recent boom in India with a number of entrepreneurs venturing in. We had two live speakers from Baroda, Dr. A. B. Mathur, IPCL and Prof. R S R Murthy, M S University along with Dr. K P Misra of BARC. Dr. Mathur discussed the biomedical applications of nanobiotechnology while Prof. Murthy touched upon likely future advances in medical technology, of only academic interest today, but having an immense, albeit controversial, life-saving potential. Dr. Misra chose to speak on targeted drug delivery with respect to cancer cells and the success of nanosize liposomes in the same.

The final session, 'Pathways to the Future' had Dr. Govil, ISCA chairing the session with Dr. Bhombal, President and CTO , Aditya Birla Group, Prof. Malshe, UICT and Prof. Khillar, Dean R&D, IIT-B sharing their words of wisdom. All the speakers spoke on how their organisations have now established themselves in the area of nanotechnology and their plans for the future.

The final event was a panel discussion chaired by Prof. B. M. Arora, TIFR with eminent panelists like Prof. Ashok Misra, Director, IIT-B, Dr. Arup Chaterjee and Prof. Malshe . The discussion focused on entrepreneurship issues in India and encouraged youngsters to venture into the work. The panel discussion was lively and fielded a number of questions

from Baroda as well, ending with a word of caution from Prof. Malshe over IPR issues and Dr. Misra and Dr. Chatterjee pinpointing the key sources of finance and information available in our country.

The winners of the poster competition were declared by the judges Prof. Srihari of DJSCOE and Dr. Deshmukh of TIFR. The Winners were Vimal Katiar and Phanikanth Hemanth Nanvaty of IIT-B with the poster titled “Synthesis Of Biodegradable Poly-(L-Lactic Acid) Nanocomposite : In-situ Approach”. The Runners up were Vrishali Madhav, R. Raman, S N Malhotra and Jens Gottmann of IIT-B with the poster titled “Pulsed Laser Deposition of Hydroxyapatite on Electro-Polished 316L Stainless Steel for Orthopaedic Implant Applications” and Debanjan Guin, Sunkara and V Panorama of IICT with the poster titled “Synthesis of Organic capped iron oxide Ferro fluids for application in nanomagnetics” The winners received a cash prize, a certificate, and a trophy and were requested to give a 10 minute presentation of their research. The event closed with a vote of thanks by Mr. Sane - Secretary, IChE MRC with each volunteer receiving a memento.

Finally, Mr. K. Venkataramanan complimented the organizing team led by Sankholkar from IChE MRC and Prof. A.K.Nigam from TIFR and the many volunteers for their untiring help that went a long way in ensuring that the seminar was a splendid success and one to be remembered for a long time to come.

K. Jayanth Pai

Member IChE

NRDC Training Manual on Intellectual Property Rights (IPR)

During the recent seminar on Nanotechnology some members of the audience had questions regarding Intellectual Property Rights and process of safeguarding the same .

In order to demystify the process National Research Development Corporation (NRDC) – New Delhi has produced an interactive CD-ROM Training Manual for education and training pertaining to Intellectual Property Rights (IPR). The CD-ROM, entitled **“Intellectual Property Rights : Key to New Wealth”** broadly contains the following :

- Basics of IPR & IP Management
- FAQ (360 questions/answers)
- Case studies from different Companies
- Glossary of definitions
- Games / Puzzles / Quizzes
- Forms and Reference information

The CD-ROM can be obtained from :

**National Research Development Corporation
(A Government of India Enterprise)**

20-22,ZamroodpurCommunityCenter

KailashColonyExtension

NewDelhi110048. India

Ph:+91-11-26419904, 26417821, 26480767, 26432627

Fax: 011-26231877, 26460506, 26478010

Website: www.nrdcindia.com

mail: write2@nrdcindia.com

The CD-Rom has been produced by Aesthetic Technologies having the following contact details:

Aesthetic Technologies

www.mmizone.com

Tel : 011 – 2644 9556/-7/-8/-9

E-mail : reachus@mmizone.com

Compiled by Avinash Sankholkar

Factory Visit cum Picnic



It was a great experience to visit the plant and see different equipment in operation as well as under maintenance. After the visit we have an idea of the problems faced while designing, erecting and operating a chemical plant. While moving around in the plant many small and big do's and don'ts were pointed out to us and we became aware of how even a small thing neglected can pose a big problem in future.

Apart from learning we also enjoyed a lot. It was all green and beautiful out there - hills, rivers and most importantly waterfalls and we did really get carried away by the flow. The food and the stay in hotel was a five starred experience.

Overall we had a great time. We like to thank Mr. Sane, Mr. Saxena , IChE-MRC, and Gharda Chemicals for arranging such a nice trip for us.

Arun Gupta
Third year student
M.G.M.C.E.T. Mumbai.

MUMBAI REGIONAL CENTRE ANNUAL REPORT for 2005-2006

1 Executive Committee

The Executive Committee comprised the following members,

Chairman : Mr.K.Venkataramanan
Vice-Chairman : Mr.K.Sahasranaman
Hon. Secretary : Mr.V.Y.Sane
Jt Hon. Secretary : Dr.S.M.Mahajani
Treasurer : Prof. R.K. Malik

Members : Mr.A.K.Adak
Dr. S. Ganeshan
Mr.M.P.Jain
Mr.P.K.Kannan
Prof. V.C.Malshe
Mr.S.B.More
Mr.A.S.Sankholkar
Mr.P.K.Saxena
Dr.Shrihari H.
Mr.V.K.Srivastava
Dr.R.N.Trivedi

Mr.V.K.Tangri resigned from the EC in November 2005 as he was unavailable due to preoccupation with the projects under his charge at BARC.

2 ACTIVITIES

The routine activities of the MRC were interrupted due to unprecedented heavy rains during July-August and resumed in September 2005.

2.1 Membership

Members added during the year:

Life Members 52

Student Chapters 2

Student Members 251

2.2 Members Database

The membership database is being continuously updated

2.3 Newsletter

There were 4 newsletters for the current year; lesser number can be explained by the non-availability of the members concerned with this activity being out of town on account of their professions.

2.4 Dhirubhai Ambani Commemoration Day

This prestigious annual 2nd Dhirubhai Ambani memorial lecture was delivered by Dr.N.Sivaram Director NCL on “Plastics - the material of the millennium”.

2.5 Dr.R.B.Roy Choudhury Memorial Lecture

The endowment lecture was held as usual on 29th January in the year 2006. This year the Lecture on “India – A Global Hub for Engineering Services” was delivered by Dr. Rama Iyer, the Executive Chairman of Aker Kvaerner Powergas India.

2.6 This year the MRC initiated another annual lecture in the honour of Mr. Henning Holck-Larsen as H.Holck Larsen Memorial Lecture on 7th February 2006. The 1st lecture was delivered by Dr Haldor Topsøe on “Challenges to the Indian Energy Industry and to Indian Supply of Heavy Equipment for the Energy Related Indian Process Industry.”

2.7 A two - day seminar as a joint effort with Baroda Chapter and in association with TIFR, ISCA was held on May 2006 in Mumbai on the topic ‘Nanotechnology : Perspectives & Prospects’. For the first time the seminar was simultaneously conducted at two venues, Mumbai and Baroda in a live videoconferencing mode.

2.8 Other Lectures

Other lectures organised were:

- 2nd November 2005 by Prof. George Stephanopoulos A.D. Little Professor of Chemical Engineering Massachusetts Institute of Technology, USA on “Innovation in a 21st Century Chemical Company”
- 12th December 2005 as one day international event “Advances in Chemical Engineering” in the honour of Prof. V.G.Pangarkar, retiring HOD of Chemical Engineering Dept. of UICT, Mumbai.
- 3rd January 2006 by Prof. George Homsy of UC Santa Barbara, USA on "Interfacial Fluid Mechanics: Past, Present and Future"
- 4th January 2006 by Mr.Raj Sardesai, consultant USA, on "How To Use Patents in Your Business"
- 30th January 2006 by Associate Prof. Douglas Hirt of Clemenson University, USA on “Using a hierarchical model of cognition to enhance Engineering education”

- 20th February 2006 by Dr. Raghavan Ramanan Fullbright Fellow, USA on “Stakeholder Response to Environmental Issues”
- 31st March 2006 by Prof. Michael Doherty of University of California, Santa Barbara, USA on “Morphology Evolution of Organic Crystals During Solution Mediated Polymorphism”
- 13th April 2006 by Prof. K. Niranjana of School Of Food Sciences University of Reading, UK on “A Product Focussed Approach to Chemical Engineering: Learning from the Experiences of Food Business”
- 19th April 2006 by Prof. Yoel Sasson, of Casali Institute of Applied Chemistry, The Hebrew University of Jerusalem, Israel on “Domino Reactions and their Role in Green Chemistry: some examples of combined C-C and C-H bond formation”

2.9 Student Chapter Programmes:

Two new student chapters were opened - on 18th Aug.2005 at MGM College and on 4th October 2005 at Datta Meghe Engineering College, Airoli. This was followed by Guest Lecture and Student’s Technical Presentation.

Student Annual programs were organised by respective student chapters. Prodigy 2006 by UICT student chapter, an annual event was organized on 18th to 20th Jan. 2006. A one-day symposium ‘Rangotsav’ was jointly organised by students of Paints Technology Division of UICT and the Mumbai Regional Centre on Oct12th 2005.

D.J.Sanghvi College of Engineering Chapter, organized “Synthesis 06” in March 2006, wherein the students formed an ‘Energy Club’ to generate interest amongst the members in the field of alternate resources of energy.

New annual event was started by Datta Meghe Engineering College (DMEC), Airoli named as Reactions 06 on 25 – 26 February 2006.

2.10 Factory visits

- UICT students from Plastics/Paints department visited glass factory of L&T at Nashik under guidance of EC member Prof.V.C.Malshe
- Chemical Engineering students of MGM College of Engineering and Technology, Panvel, visited Larsen & Toubro, Powai Works.

- Visit of students from Navi Mumbai chemical engineering colleges to BPCL in October 2005
- The student chapter of Thadomal Shahani Engineering College arranged a three day industrial visit to Vapi, Gujarat in March 2006.
- A visit to M/s Gharda Chemicals Lote (near Chiplun town) on the Mumbai-Goa highway on 24-25 June 2006 for the MRC members. Interaction with Lote Chapter was also on the agenda during the visit.

2.11 New Programmes undertaken this year:

- Outstanding Young Chemical Engineer contest (OYCE-05) conducted in December 2005
- ChEQ, annual inter-collegiate Chemical Engineering Quiz for colleges in around Mumbai, with a rolling Trophy in memory of the eminent Chemical Engineer late Prof. N.R.Kamath.
- Dip-stick survey to ascertain the interests and needs of our young members and the motivation for their active participation in the activities of the institute.

2.12 Executive Committee Meetings

The executive committee of the MRC had monthly meetings throughout the year to plan and execute the normal activities and for implementing new programs that were initiated this year.

Signed
V.Y.Sane
Hon.Secretary

Minutes of the 46th Annual General Meeting
held on 16th June 2006 at
Chemical Engineering Department, IIT Bombay.

The meeting was convened at 6.30 PM, adjourned for lack of quorum and reconvened at 7.00 PM by the Chairman Mr. K. Venkataramanan. On reconvening the attendance was 23.

The minutes of the 45th AGM held on 24th June 2005 and the EGM held on 19th August 2005 were taken as read by Mr.V.Y.Sane, Hon. Secretary MRC, as the same was already published in the newsletter. The minutes were approved, proposed by Mr. D.P.Misra and seconded by Prof. G.D.Yadav.

A report on the activities for the current year, (July 2005 to June 2006), was presented by the Hon. Secretary. A special vote of thanks to the Chairman Mr. K. Venkataramanan for the efforts put in to organise new events was proposed by Prof.G.D.Yadav and approved unanimously. During the discussion, it was felt that lady members are not represented in the activities of MRC. It was suggested that lady faculty members from educational institutes like IIT, UICT and other colleges be co-opted in the EC. After a brief discussion the report was unanimously adopted, proposed by Prof. Ashok Misra and seconded by Dr. M.K.Bhattacharjee.

Prof.R.K.Malik, Hon. Treasurer presented the audited accounts. Prof.G.D.Yadav proposed that the equipment mentioned in the accounts statement be written off as they are beyond repairs, and many of them are not serviceable. The proposal was adopted unanimously. During the discussions it was felt that part of the money which is kept currently in fixed deposits be shifted to Government approved securities like Reserve Bank of India's bonds, so as to get higher rate of interest. The formalities needed to accept the Foreign Exchange remittances from interested NRI chemical engineers were also discussed and it was felt that the same should be taken up with the headquarters. The audited accounts was unanimously adopted by the members, proposed by Prof.G.D.Yadav and seconded by Mr.V.K.Srivastava.

A proposal was tabled that the services of the present auditors, KS Jhaveri, be extended for one more year at the same remuneration. The resolution was proposed by Mr. D.P. Misra and seconded by Mr.J.N.Master and unanimously adopted.

The Hon. Secretary announced the results of the election to the EC. The elected members are:

Dr.S.S.Bhagwat
Dr.B.Chakraborty
Dr.S.Ganeshan
Mr.M.P.Jain

Dr.S.M.Mahajani
Prof.V.C.Malshe
Mr.S.B.More
Mr.K.Sahasranaman
Mr.P.D.Samudra
Mr.V.Y.Sane
Mr.P.K.Saxena
Dr.Shrihari H.
Mr.V.K.Srivastava
Dr.R.N.Trivedi

The members were updated on the various steps being taken to acquire office space and this would be one of the major activities of the incoming EC

It was unanimously adopted that special thanks be given to both IIT and UICT for providing their facilities to MRC for carrying out EC meetings and related activities.

The meeting then adjourned.

Signed
V.Y.Sane
Hon. Secretary
IChE - Mumbai Regional Centre

Numerology

This column will feature Dimensionless numbers that rule the empirical world of Chemical Engineering. This month's number is Cavitation Number which is defined as

$$N_{cv} = 2 (p - p_v) / \rho V^2$$

where

p = static pressure in undisturbed flow

p_v = vapour pressure

V = free-stream velocity of the liquid

ρ = liquid density

Cavitation is the phenomenon of collapse of vapour bubbles in flowing liquid. The value of the Cavitation Number for incipient cavitation for specific equipment is a characteristic of that equipment, and hence this number is used to correlate equipment performance.

Website of the Month.

This month's website <http://www.nano.gov/> is maintained by the National Nanotechnology Initiative, a US Government programme to coordinate the multiagency efforts in nanoscale science, engineering, and technology. The site has loads of news and updates on current developments in the field.

Did you know?

The discovery of nanoscale carbon form, C₆₀, the fullerene (also called the buckyball) brought the Nobel Prize in Chemistry in 1996 to Robert F. Curl Jr., Sir Harold W. Kroto, and Richard E. Smalley. It also started an avalanche of research into not only the novel characteristics of C₆₀, but also other nanoscale materials.

Forthcoming Programmes

1st July 06 MRC hosts National Council Meeting

Keep watching our website www.iichemrc.org for further announcements.