

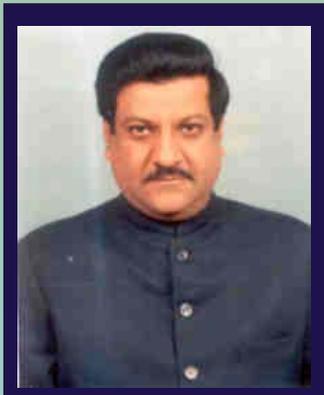
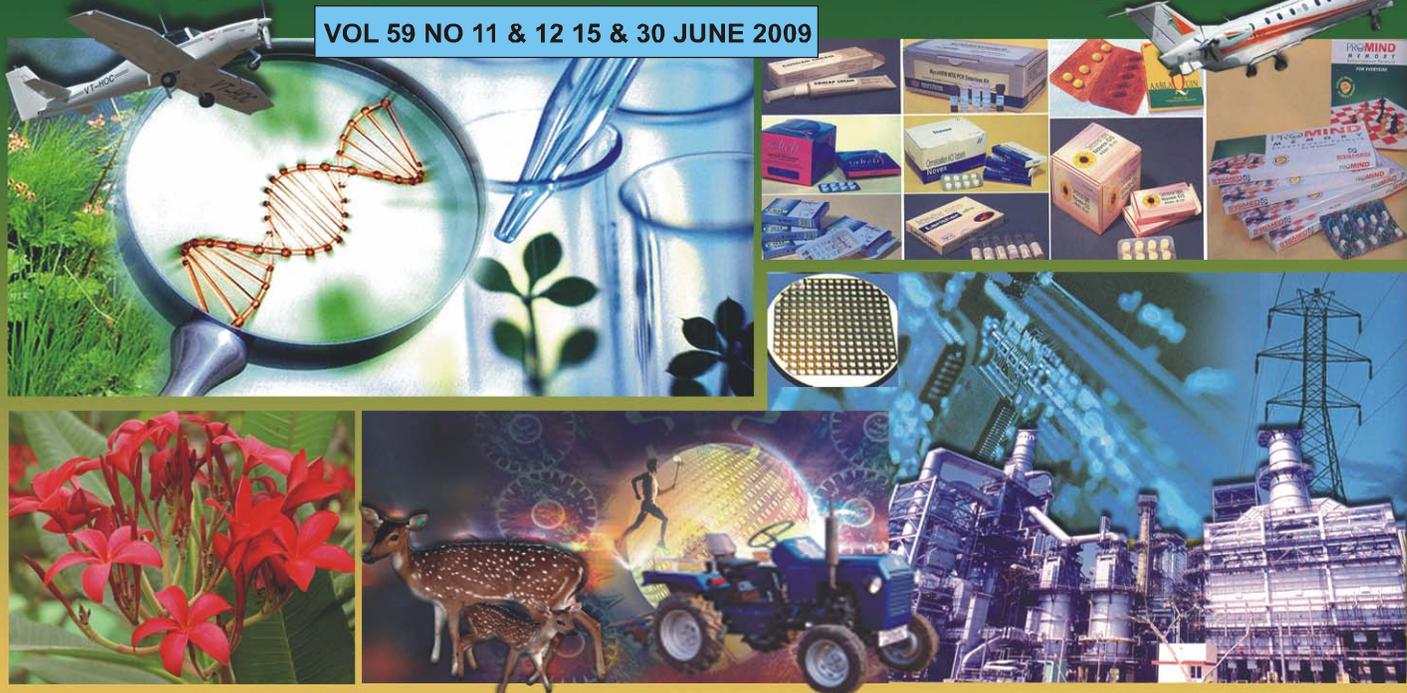


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# CSIR NEWS



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## Shri Prithviraj Chavan takes over as Vice President of CSIR

**Shri Prithviraj Chavan**, Minister of State (Independent Charge) of Ministry of Science and Technology; Minister of State (Independent Charge) of Ministry of Earth Sciences and Minister of State in the Prime Minister's Office; Minister of State in the Ministry of Personnel, Public Grievances and Pensions and Minister of State in the Ministry of Parliamentary Affairs has taken over as the Vice President of CSIR.

Shri Chavan (b. 17 March 1946) is a B.E.(Hons) and M.S. from Birla Institute of Technology and Science (BITS), Pilani, Rajasthan and University of California, Berkeley, U.S.A and is an engineer/technologist by profession.

Shri Chavan was Member of the Tenth, Eleventh and Twelfth Lok Sabha. He has been elected to Rajya Sabha twice, once in April 2002 and then in April 2008 and continues to be a member of the upper house of Indian Parliament.

Shri Chavan has held numerous important portfolios and been associated with several apex policy making committees. He was Member, Consultative Committee for the Ministry of Science and Technology, Electronics, Atomic Energy (1991-96); Member, Committee on Science and Technology, Environment and Forests (1992-93);



Member, Standing Committee on Finance and Planning, Member, Standing Committee on Rural and Urban Development (1994-96); Member, Committee on Public Undertakings Member, Committee on Subordinate Legislation Special Invitee, Business Advisory Committee (1995-96); Deputy Chief Whip, Lok Sabha, Congress Parliamentary Party, Member, Committee on Energy, Member, Consultative Committee for the Ministry of Finance (1996-97); Member, Committee on Public Accounts (1996-97 and 1998-2000); Secretary, Congress Parliamentary Party (1996-98); Member, Committee on Provision of Computers to Members of Parliament (1996-99); Special Invitee, Consultative Committee for the Ministry of Planning and Programme Implementation and Ministry of Science and Technology (1997); Consultative Committee for the Ministry of Home Affairs Member, Committee on Government Assurances (1998-99, resigned on 20 November 1998); Member, Committee on Finance (1998-99 and April 2002-Feb.2004); Spokesperson, All India Congress Committee (2000-01); Member, Consultative Committee for the Ministry of Defence (Aug.2002-Feb.2004); and Member, Congress Working Committee, and General-Secretary, AICC (September 2007 onwards).

Shri Chavan has been Minister of State in the Prime Minister's Office since May 2004; and Minister of State in the Ministry of Personnel, Public Grievances and Pensions since April 2008.

## Unraveling Earth's Plate Dynamics using Seismic Waves

Our planet is dynamic, where the lithospheric plates, which constitute the uppermost rigid part of the Earth's layer, float over a weaker and more deformable asthenosphere because of higher temperature and pressure inside the Earth. The precise nature of the

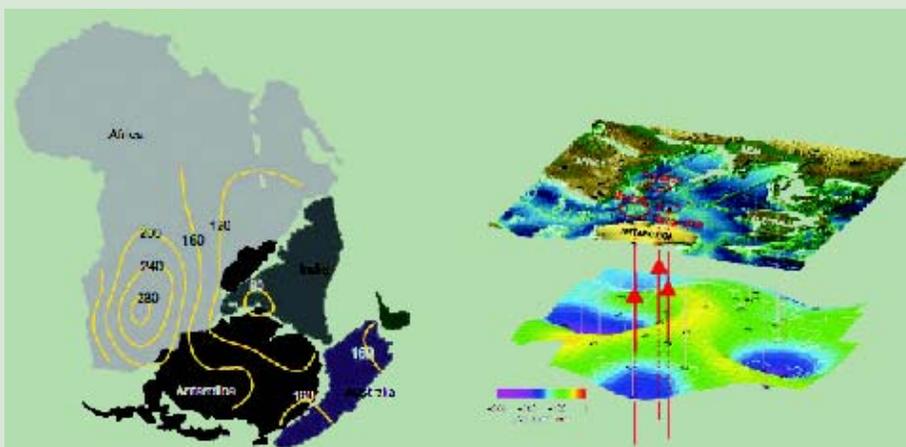
asthenosphere is still illusive. Understanding the lithosphere-asthenosphere boundary (LAB) is thus, a key to unravel the dynamics of our planet.

Using a recently developed seismic technique, the 'S-wave receiver function', the scientists

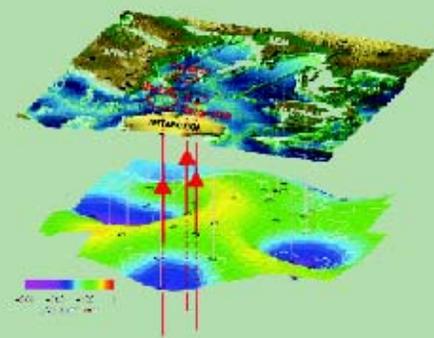
working at the National Geophysical Research Institute (NGRI), Hyderabad, measured the lithospheric thickness of several continents based on LAB, with very high accuracy. The continents concerned — India, Africa, Antarctica and Australia — were all part of Gondwanaland, the supercontinent that broke up with the creation of the Indian Ocean (Fig. 1).

In a paper entitled 'The Rapid Drift of the Indian Tectonic Plate' by Prakash Kumar, Xiaohui Yuan, M. Ravi Kumar, Rainer Kind, Xueqing Li and R. K. Chadha, published in *Nature*, 449, 18 October 2007, the authors show that lithosphere in South Africa, Antarctica and Australia are more than 180 km thick, whereas Indian lithosphere is only about 100 km thick, even where the crust is of Archaean age (Fig. 2).

In the present work, Dr Prakash along with Japanese



**Fig. 1.** Reconstruction of Permian Gondwanaland. The contours show the present-day continental lithospheric thicknesses.



**Fig. 2.** Topography of the surface and the LAB in the region of the Indian Ocean and the fragments of Gondwanaland surrounding it.

workers estimated the LAB below the Pacific and Philippine oceanic plates using data from borehole broadband ocean bottom seismometers in the Pacific ocean. These results are consistent with the thermally controlled origin for the oceanic LAB and then provide a very convincing and acceptable

answer to an ongoing global debate on the super mobility of the Indian plate at a rate of 18-20 cm per year vis-a-vis African and Australian plates which moved at a rate of 2-4 cm per year during late cretaceous time (130 my). Earlier, the Indian lithosphere was thought to be thick, going up to 400 km. The work of NGRI scientists

has great implications in understanding the movement of various other oceanic and continental plates in the world and their present day configuration, by establishing LAB below these using S-wave receiver function technique.

## New Projects

### Modular Re-configurable Micro Manufacturing Systems (MRMMS) for Multi Material Desktop Manufacturing Capabilities

*Sponsor : CSIR; Sanctioned Amount : Rs 19 crore [Rs 4 crore for Central Electronics Engineering Research Institute (CEERI)]*

*Participating Institutes : Cenral Mechanical engineering Research Institute (CMERI) (Nodal Lab) CEERI, Central Scientific Instruments Organization (CSIO) and National Aerospace Laboratories (NAL); Duration : 5 years*

The overall programme is to develop modular and flexible manufacturing systems for cost effective manufacturing of multi-material micro systems/devices, having 3D geometries with high aspect ration. The important components of the targeted micro factory test bed include:

- Miniature machine tools for micro milling, micro EDM and laser machining leading to micro factory test bed.
- High speed air and magnetic bearings for micro-machine tools.
- Intelligent controllers and diagnostic systems.
- Ionic Polymer Metal Composite (IPMC) or Shape Memory Alloy (SMA) based handling system for micro factory manipulations.
- Laser processing of metal and ceramics.

#### Objectives

Different research teams in their specific areas would execute the following planned tasks, which will

be integrated to demonstrate a micro factory capability. The sub-tasks identified among the participating laboratories are as follows:

- Development of multi-functional micromachine tool for tool-based manufacturing processes.
- Development of multi-functional laser processing systems for micro and meso applications.
- Development of oil-free bearing for micromachine tools.
- Development of micro parts handling systems using IPMC and SMA.
- Plantinisation of Nation polymer towards development of IPMC.
- Intelligent controllers and sub-systems for micro-factory systems.
- Micro factory test bed.
- Development of microfabrication methodology for ceramics.
- Development of PCB based micro-generator and hearing aid.



### **Maintaining 3" Silicon Wafer Fabrication Facility for Supporting R&D Projects**

**Sponsor : National Programme on Micro and Smart Systems (NPMASS); Sanctioned Amount : Rs 3.3. crore; Duration : 3 years**

#### ***Expected Output***

Training on MEMS processing under HRD and providing multi-user MEMS prototyping runs.

CEERI has been successfully fabricating various MEMS structures and prototype devices for the users in the country. It is envisaged that MEMS structures and devices will find increasing use in strategic applications and also in commercial market for a variety of applications. There are several organization that provide design and modeling facilities, but fabrication facilities are beyond the reach of many. Consequently, the trained manpower in semiconductor and MEMS technology is limited. It is very essential to encourage training and learning the technology. CEERI has taken up the initiative of human resource development with the support from NPMASS for up-keeping of the fabrication facilities to utilize these for manpower training and to develop processes/prototypes for MEMS.

It is proposed to provide/maintain 3" silicon semiconductor fabrication facility for the MEMS pro-

cess training and MEMS prototyping runs. Typically, every month a 10-wafer batch will be initiated and training will be conducted on various process techniques and technologies involved in the fabrication of MEMS structures and devices. The basic unit processes of the semi conductor technology such as mask making, wafer cleaning, thermal oxidation, thermal diffusion, ion implantation, chemical etching, photolithography, chemical vapour deposition, reactive ion etching, bulk micromaching, electroplating and metallization will be demonstrated. Expert lectures and technical/technological presentations on all the unit processes will be arranged to discuss the processes and their applications for MEMS devices.

In addition, a standard process flow coordinates through a central agency under NPMASS will be evolved for MEMS prototyping runs and process runs will be done, as required.

### **Advanced Eco-friendly, Energy-efficient Processes for Utilization of Iron Ore Resources of India**

**Sponsor : CSIR; Sanctioned Amount : Rs one crore**

**Participating Institutes : Institute of Minerals and Materials Technology, Bhubaneswar (IMMT) (Nodal Lab) National Metallurgical Laboratory (NML), North-East Institute of Science and Technology (NEIST) and CEERI; Duration : 5 years**

Currently, conservation of iron resources is accorded top priority as the natural resources are dwindling and wastages in processing are high. Moreover, the iron ore available in India is of low quality. In order to utilize the resources optimally, a CSIR Net-

work Project has been taken up. Participation of CEERI is divided into three activities:

(i) **Development of Impact Analysis System for Tumbling Ball Mills** : Normally, tumbling ball mills are used in the comminuting (reduction of ma-

terial to smaller size) process to break the crushed ore to required pellet size. It becomes the feed to the steel mills. The ball mills employ alloy steel balls for grinding the crushed ore. This process generates sound patterns or signatures, known as impact signal, where an efficient operator would know precisely when the ore is ground to proper pellets. However, the whole process is noisy and surrounded by other heavy machinery further complicating the identification of proper signal.

**Objective**

- Efficient transmission of the impact signal for further processing through a novel wireless sensor system and sensor fusion techniques

**(ii) Pulsation Behaviour Monitoring Subsystem for Jigging Process in Iron Ore Processing :**

Need for a pulsation behavior monitoring system was felt in the jigging process. This is an important step in the iron ore processing for separating and analyzing the stratified layers through the pulsation and suction cycles in the formation of concentrate, tailings and middling.

**Objective**

- Development of a pulsation behaviour monitoring system for the jigging process, where the mixed

particles separated will be analyzed through a pulsation and suction monitoring system.

**(iii) Development of Image Processing Techniques to Measure the Pellet Size Distribution:**

Iron ore is upgraded to a higher iron content through concentration. The concentrate must be pelletized to produce a pellet of the correct size and strength for use as a feed to a blast furnace. The aim of this project is to develop a prototype 2D imaging and analysis system for non-contact measurement of the size of iron ore pellets on the conveyor belt. The image capturing and analysis software will be developed using high-resolution camera and accessories.

**Objectives**

- Image processing techniques to find out the size of pellets.
- Size distribution is to be generated from a given image.
- Offline simulation on captured images will be carried out.
- A camera based prototype embedded system will be developed to do size distribution analysis in real-time.

## Smart Pond Management System for Freshwater Aquaculture

**Sponsor: Department of Biotechnology; Sanctioned Amount : Rs 87 Lakh; Duration : 3 years**

The project aims to develop a continuous environmental monitoring electronic device for freshwater ponds for identification of critical limits of important water quality parameters, providing alarm at critical points and automated remedial measures through software-hardware integration for controllable parameters. It also estimates the stress factor on the fish (on-line) by means of a suitable model realized over the years for efficient farming operation. This has been reflected as one of the priority areas of research in the Central Institute of Freshwater Aquaculture, a premier fisheries research institute of the country.

**Objectives**

- On-line continuous display and alarms for critical pond parameters.
- History of critical pond parameters such as dissolved oxygen, pH, temperature, ammonia, carbon dioxide, conductivity, water level and transparency.
- Sensor based demand feeders.
- Prediction of on-line stress factors on fish.
- Networking of ponds.



### Appropriate Automation for Central Salt and Marine Chemicals Research Institute(CSMCRI)-designed RO Plant

**Sponsor : CSMCRI, Bhavnagar; Sanctioned Amount : Rs 12 Lakh; Duration : 18 months**

It is a known fact that present day world is heavily dependent on water and water resources. Be it an industry or society, without water the whole system collapses. Providing potable water to the masses is indeed a challenging task. With the increase in population and industrialization the demand for water is increasing, whereas, the fresh water resources are drying up. The scenario is worse in India. Ground water is abundantly available in our country, but it is mostly salty. Various techniques are available for converting salt water into safe drinking water and Reverse Osmosis (RO) technique is one of them. CSMCRI (CSIR), Bhavnagar, has developed a turnkey technology for RO. Their RO plants are successfully installed all over India. The present project is aimed at providing appropriate automation to the CSMCRI designed RO plants. The proposed system continuously monitors all the critical parameters, stores and provides minimal auto control.

#### Objectives:

- Design and development of appropriate automation system for the RO Plant.
- Monitor, display and store all critical parameters such as pressure at various points, pH, temperature, total dissolved salts (TDS), water flow, turbidity and other parameters as identified by CSMCRI.
- Providing alarms and history.
- Providing Auto/Manual operation.
- Design and development of GUI based interfaces.
- Parameters to be derived: rate of removal of salts, rate of scaling and health of the plant.
- Parameters to be controlled: final pressure, water flow and TDS.

### Process Analytical Technology (PAT) Methods for Standardization in Pharmaceutical Industry

**Sponsor : Department of Science and Technology (DST); Sanctioned amount : Rs 87 Lakh (DST : Rs 61 lakh, M/s Elico : Rs 14 lakh and CEERI : Rs 12 lakh); Duration : 2 years**

CEERI Centre, Chennai, has teamed up with M/s Elico Ltd, (A leading analytical manufacturing company), Hyderabad, for a joint R&D project on 'Process Analytical Technology (PAT) Methods, for Standardization in Pharmaceutical Industry'. M/s Orchid Health Care has come forward to get associated with this project as a user industry to facilitate experimentation. In this connection, an MoU was signed between CEERI and M/s Elico Ltd.

A near infrared (NIR) diode array spectrometer will be configured and developed by M/s Elico Ltd for use in this project, with appropriate support from CEERI Centre. The final product based on di-

ode detector array module will be installed in the identified user industry for field trials and as a demonstration model.

#### Objectives

- Development of versatile online methods for Process Analytical Technology (PAT) in Pharma for raw materials compliance and standardization of unit processes viz. granulation and drying by using suitable configured NIR spectrometer with fibre optic sample probes.
- To work closely with associated pharma industry

to make provision for installation of NIR spectrometer in unit processes namely, granulation and drying for model building and validation.

- To improve current good manufacturing practice methods for granulation and drying unit processes using online information from NIR spectrometer with fibre optic probe inserted in the process to improve product quality and yield, reduce scrap

and increase speed of analysis.

- To investigate appropriate pre-processing techniques and apply for model building using various chemometric techniques for qualitative/quantitative analysis.
- To conduct awareness programme on PAT in pharma industries to propagate methods developed/standardized.

## Four *HANSA-3* Aircraft deliveries to DGCA and Flight Familiarization Programme conducted for Customer Pilots at NAL

Director General Civil Aviation (DGCA) has taken the delivery of totally four *Hansa-3* aircraft during the 2008 (viz., VT-HNZ, VT-HOC, VT-HOE and VT-HOF) and allotted two aircraft to Madras, one each to Assam and Amritsar flying clubs. Two aircrafts to Madras flying club have been ferried during 2008. Ferry operations of *Hansa-3* to Amritsar and Assam Flying clubs were planned during the month of March 2009. Training course on *Hansa-3* Airframe and Rotax engine was provided to ground engineers of these flying clubs during November 2008.

The customer pilot familiarization programme was conducted during 27-30 January 2009. This programme was con-

ducted to impart flight familiarization and inspection procedures to the customer pilots on *Hansa-3* aircraft. The following Chief Flight Instructors from three flying clubs attended and successfully completed the course.

Capt. A.K. Singh, Chief Flying Instructor, Assam Flying Club; Capt. N.K.Singh, Chief Flying Instructor, Madras Flying Club; and Capt. Rachhpal Singh, Chief Flying Instructor, Amritsar Aviation Club.

The Programme had morning sessions covering Ground Instructions and the afternoon sessions on Flight Familiarization. AVM (Retd.) Ajit Singh Lamba VrC, Test Pilot, *Hansa-3* gave the familiarization flights to these pilots. Wg. Cdr. (Retd.) P. Ashoka

delivered the ground instructions on systems, operational requirements and emergency procedures. Shri Satish R R. and Shri Shijo K. Francis delivered lectures on Airframe & Power plant respectively.

Documents and the keys of two *Hansa-3* aircraft were handed over to Shri D. N. Lahon, Director AED DGCA, Bangalore by Director, NAL. Shri D. N. Lahon handed over the documents and the keys to Capt. Rachhpal Singh, CFI-Amritsar Aviation Club and Capt. A.K. Singh, CFI-Assam Flying Club. Director NAL issued the Flight Training Certificates and mementos to the participants during the dinner hosted by him.



### CRSI National Symposium in Chemistry at NCL

The National Chemical Laboratory (NCL), Pune, hosted the Chemical Research Society of India (CRSI) Annual Meeting in the form of eleventh National Symposium in Chemistry (NSC-11) during 6-8 February 2009. This was preceded by one-day meeting in association with the Royal Society of Chemistry (RSC) held on 5 February 2009. Over 800 delegates from India and abroad participated in the mega meeting of NSC. The meeting provided a forum to many young students to present their research work in the form of posters. More than 300 posters were displayed in two sessions. The thematic session of this year's meeting was devoted to Functional Materials. The event featured talks by more than 25 distinguished speakers from India and abroad covering the thematic session, Medal Lectures, and Award Lectures in nine scientific sessions spread over three days. The symposium covered presentations cutting across all disciplines of chemistry and thus represented a comprehensive coverage of state-of-the-art research in chemical science. A special Keynote Lecture was delivered by Prof. C. N. R. Rao, the Founder-President of CRSI. Prof. Rao spoke on Graphene, the New Nanocarbon. Besides, Dr Harjit Singh and Dr S. Rajappa gave Lifetime Achievement Award Lectures.

The symposium was held as a part of NCL's Diamond Jubilee celebrations that aimed to bring together the practitioners of science from industry, academia and Government to NCL for scientific discussions and interactions.

Dr S. Sivaram, Director, NCL, and the chairperson of the local organizing committee welcomed the participants, distinguished speakers and office bearers of CRSI. Dr



Prof. V. Krishnan delivering the Presidential Address

Sourav Pal, co-convenor of the symposium and Head, Physical and Materials Chemistry Division of NCL gave the background of the symposium. Prof. V. Krishnan, the President of CRSI delivered the Presidential Address and Dr Ganesh Pandey, co-convenor of the symposium and Head, Organic Chemistry Division of NCL proposed the vote of thanks.

The special and medal lectures were delivered by Prof. Peter Edwards, Oxford, UK; Prof. A. K. Shukla, CECRI, Karaikudi; Prof. V.V.

Suresh Babu, Bangalore University; Prof. Tobin Marks, Northwestern University, Evanston, USA; Prof. Santanu Bhattacharya, IISc, Bangalore; Prof. B. R. Jagirdar, IISc; Dr Suresh Das, NIIST, Trivandrum; Prof. S. Mashraqui, University of Mumbai; Prof. H.S.P. Rao, Pondicherry University; Prof. S. Balasubramanian, JNCASR, Bangalore; Dr C.S. Gopinath, NCL; Prof. Kamaljit Singh, Guru Nanak

Dev University, Amritsar; Prof. Musti J. Swamy, University of Hyderabad; Dr Sourav Pal, NCL; Dr Amitava Das, CSMCRI, Bhavnagar; Prof. Lallan Mishra, Banaras Hindu University, Varanasi; and Prof. L.D.S. Yadav, University of Allahabad.

Thematic Sessions spread over two scientific sessions had distinguished speakers such as Prof. Henry Schaefer,

University of Georgia, USA; Prof. T. P. Radhakrishnan, University of Hyderabad; Dr S.K. Ghosh, BARC, Mumbai; Prof. T. Pradeep, IIT-Madras, Prof. M. Eswaramoorthy, JNCASR, Bangalore; Dr S. B. Ogale, NCL, and Dr George Thomas, NIIST, Trivandrum.

Prof. Rao presented a special Keynote Lecture on the infinite possibilities of "Graphene, the New Nanocarbon" for the next generation devices illustrating the unique power of chemistry in tailoring func-



tional nanomaterials. He elegantly illustrated the basic principles of designing molecular materials considering graphene as an explicit example, with many prophetic revelations on the future of chemistry in India. This was followed by Prof. CNR Rao Award Lecture, "Energy Materials Chemistry: A New Interdiscipline" delivered by Prof. P. Edwards, Oxford, highlighting the importance of a broad spectrum of chemical transformations to cater our immediate energy needs including development of innovative hybrid materials for harnessing solar energy, for storing hydrogen, for new generation of fuel cells and rechargeable batteries etc.

There were also two special sessions exclusively dedicated to functional materials. In the first session on 7 February 2009, the session Chairperson Dr K. Vijayamohan from NCL introduced the theme and chemistry's critical role in designing functional materials after illustrating the selection of speakers and topics from a general perspective of blending of both theory and experiment. This was followed by an opening lecture on 'Gallium-nitride oligomers and nano rods' by Prof. Henry Schaefer, University of Georgia, USA, to explain the importance of density functional theory as a guiding tool for experimentalists. An outline of the theoretical advances in modeling gas phase reactions leading to the formation of 13-15 binary materials from donor-acceptor complexes was given with special

emphasis on gallium nitride nanorods followed by illustration of the use of 13-15 compounds as single-source precursors to 13-15 alloys and their potential as hydrogen storage materials.

Subsequently, Prof. T.P. Radhakrishnan, University of Hyderabad, explained the principles behind the assembly of molecular materials in his lecture 'Molecular

'Modeling Materials through Density Functional Theory at Different Length Scales' providing a glimpse of the conceptual as well as computational developments covering all the length scales of interest in a number of areas of chemistry, physics and materials science with the concept of single-particle density. This first session on Functional materials was concluded after the last

lecture on 'Functional nanoparticle crystals' by Prof. T. Pradeep, IIT, Madras, who outlined the uncanny way of assembling particles, rods, wires and several such fascinating structures in periodic form to benefit from their collective behaviour.

The second session on Functional Materials on 8 February 2009 started with the lecture of Prof. M.

Eswaramorthy, JNCASR, Bangalore, on 'Functional Carbon Nanostructures: Preparation, Characterization and Applications' where the potential of glucose derived carbon nanostructures after suitable functionalization strategies for a variety of applications like template based materials synthesis, tissue engineering and drug delivery were discussed, followed by a lecture on 'Functional Nanomaterials for solar energy and optoelectronics' by Prof. S. B. Ogale from NCL to illustrate the enabling power of functional materials to harness solar energy taking specific examples like titania nanorods and similar hybrid materials with



Prof. C. N. R. Rao delivering Special Keynote Lecture

Optical Materials: Form — Function Correlations in Crystals, Nanocrystals and Ultrathin Films'. He selected examples that highlighted the intimate and sensitive relation between the form of assembly and optical or nonlinear optical functions, delineated through their explorations of molecular crystals, nano/microcrystals and Langmuir-Blodgett films along with the attempts to effectively utilize molecular symmetry and crystallization conditions which enhance second harmonic generation response. After this Dr S.K. Ghosh, BARC, Mumbai, elegantly elucidated the current status of theoretical research through his lecture on



suitable surface modification. The last lecture of this session was given by Dr George Thomas, NIIST, on 'Optical Properties of Core-shell Quantum Dots' where elementary principle of the design of semiconductor quantum dots (QDs) and various photoinduced processes in these systems preventing the electron transfer process were clearly illustrated citing specific examples like CdSe, ZnS and CdTe quantum dots as selective and sensitive probes for various biologically important molecules and ions. The session was finally concluded by the chair Dr. K. Vijayamohan summarising the major points of all the overwhelming talks of both the sessions along with few possible next generation challenges in the area of advanced functional materials.

In the first Lifetime Achievement Award Lecture, Dr Harjit Singh in his talk on, 'An Exciting Journey in the Company of Heterocycles' gave a flashback on the events of his research activity over the years, addressing to some then contemporary and attractive themes on synthetic methodologies, coenzyme models, host-guest chemistry etc. and pointed to an in-built core theme of involving the use of heterocycles in most of these investigations. He also highlighted the glimpses of results in these areas invoking heterocycles as operational modes. In early seventies, his team had found that base-assisted sulphur extrusion reactions of appropriate thioamide derivatives invoking transitory thiiran rings, even in the absence of a thiophile, provided

practicable synthetic approach for a variety of functionalized enamine intermediates.

In the second Lifetime Achievement Award, Dr S. Rajappa in his talk on, 'The attraction of the nitro group' said that his team has been utilizing aliphatic nitro compounds as synthons research for over thirty five years. He has investigated the enamining potential of nitroenamines and had initially demonstrated that nitroenamines can, in fact, be used for the synthesis of various nitroheterocycles. A more interesting possibility was the application of nitroacetamides in the synthesis of peptides. This called for discovering a convenient and general method for the synthesis of the starting nitroacetamides. With the knowledge of the chemistry of nitrovinylamines and nitroketeneaminals, he succeeded in developing such synthetic methods for nitroacetamides and even the fragile nitrothioacetamides. With these substrates in hand, he created new C-C bonds on the reactive methylene and converted the products into peptide analogues incorporating non-natural amino acids. The effort also resulted in discovering a general synthesis of cyclic hydroxamic acids including chiralbicyclic 1-hydroxypiperazine-2,5-diones.

CRSI- RSC meeting held on 5 February 2009, featured five lectures by Indian speakers and five lectures by UK researchers. This CRSI-RSC meeting was well attended by over 150 persons, many of them being junior researchers.

### International Workshop on using the Booroola Gene in Sheep Breeding Programmes

The National Chemical Laboratory (NCL), Pune ([www.ncl-india.org](http://www.ncl-india.org)) hosted Helen Newton Turner Memorial International Workshop on using the FecB (Booroola) gene in sheep breeding programs from 10-12 November 2008. Pune sits on the Deccan Plateau, an area where more than 20 million Deccani sheep play an integral role in the agricultural system. The workshop was jointly organised by NCL, Nimbkar Agricultural Research Institute (NARI), Phaltan and University of New England (UNE), Australia. About 80 participants from 15 countries attended the workshop. The workshop included 17 invited talks spread over six scientific sessions and a one-day field trip to Phaltan to show the participants, Booroola gene carrier animals in the NARI flock and in shepherds' flocks and the environment in which they are reared.

The workshop had its origin in more than a decade-long research programme in India on improved meat sheep production supported by the Australian Centre for International Agricultural Research (ACIAR). This research programme had a strong focus on

genetic improvement of sheep reproductive rate and was initiated in 1993 at the NARI at Phaltan, near Pune, with the purchase of prolific Garole sheep from the Sunderbans regions of West Bengal. Mr Bon Nimbkar, the founder of NARI had established the Animal Husbandry Division of NARI in 1990. He contacted Dr Helen Newton Turner, the celebrated Australian sheep geneticist



Prof. S.W. Walkden-Brown, Australia, giving background of the Workshop

and advocate of genetic improvement of reproductive rate in sheep. Although, Dr Newton Turner was unable to visit NARI, Dr Douglas Gray who was visiting India at the time was able to do this, and with some seed money from ACIAR, and involvement of molecular geneticists from NCL, a new project was born. The workshop was organized with these objectives: to review current knowledge of the FecB gene and its worldwide application in sheep breeding, to present the key results of the ACIAR projects related to the FecB gene in India 1998-2007, to assist Indian Government policy makers to formulate policy regarding the wider dissemination of the FecB gene in the national flock, and to consider the implications of the workshop findings for countries other than India.

The workshop was co-sponsored by ACIAR, The Australian Academy of Technological Sciences and Engineering (ATSE), International Science Linkages - Science Academies Programme (ISL-SAP), Department of Science and Technology, Govern-

ment of India, Department of Biotechnology, Government of India, Nimbkar Seeds Pvt. Ltd, Phaltan and donor individuals and companies.

Mr. R. S. Shendage, Chairman, Maharashtra Sheep and Goat Development Corporation while inaugurating the workshop highlighted sheep rearing in Maharashtra, its economics and monetary benefits by introgressing FecB gene in Indian breeds. It was followed by introduction to the workshop by Prof. S.W. Walkden-Brown, Australia, who is the Australian project leader of the ACIAR-funded projects since 1998. There were three scientific sessions on the inaugural day of the workshop, namely Background and History, Physiological Aspects of the Booroola Gene Mechanism and Case Studies on Introgression of FecB in Local Breeds. Invited speakers for these three sessions were Drs G. H. Davis, S. Pan, B. Campbell, V. Gupta, N. Fogarty, G. N. Hinch, C. Nimbkar, S. W. Walkden-Brown and A. L. Arora. This was followed by Poster session and discussion of posters. Finally, a film on Garole sheep was screened.

On the second day of the workshop, all the participants visited the NARI campus to observe the performance of NARI-Suvarna on the farm. The participants were briefed on sheep keeping practices. In the afternoon session, a visit was organized to a shepherd's flock to gather practical information on rearing NARI-Suvarna at the shepherd's field. The shepherds and the participants ex-

changed their views on sheep breeding. The shepherds performed Gajji dance for the participants.

Two scientific sessions namely Case Studies on Introgression of FecB Gene in Local Breeds and The Way Forward: Introgressing FecB in the Wider Population were conducted on the concluding day of the workshop. The speakers were Drs. E. Gootwine, D. Notter, I. Inounu, G. Hua, L. Bodin, J. Van der Werf, A. Swan, C. Nimbkar, P. Ghalsasi and K. Marshall.

The last session of the workshop comprised a panel discussion on, 'The Policy Implications for Wider Dissemination in India of Sheep Containing the FecB Gene Arising from the ACIAR Projects'. Finally, the workshop outcomes were summarised by Drs J. van der Werf and C. Nimbkar while concluding remarks were given by Dr Vidya Gupta.

The workshop culminated with following recommendations:

- The ACIAR will bring out the proceedings of the workshop and it will represent a major



scientific contribution in the area of FecB research. The last international workshop on FecB was in France in 1991. In the intervening 17 years, the causative mutation has been identified, a direct DNA test for it developed, the mutation has been discovered in a wide range of breeds, in two of which (Garole and Hu) it appears to be fixed, and a great deal of applied research on the effect of the mutation in animal production systems has been carried out. The proceedings is expected to capture these issues.

- Establishment of a broad network of scientists and farmers working on FecB, particularly with regards to its application in animal production. The centre of gravity of this work is shifting away from Aust/NZ/

Europe towards India and China.

- Exposure of a wide selection of Indian scientists to some of the negative experiences with the FecB mutation in other countries. This will assist in dampening some of the "Booroola euphoria" in India, associated with identification of the Garole sheep as the probable origin of the mutation in Australia and possibly worldwide.
- Introgression of the FecB mutation in major India breeds of sheep was supported. It was felt that this process was already under way and would be best managed as a series of collaborative projects funded by ICAR and the like, rather than a major "All India" project. The best results are likely to

be in breeds with low initial prolificacy and where the opportunity for improved nutritional management exists. The potential for lamb survival problems in homozygous carrier ewes is recognised, but there is insufficient evidence of it to date to warrant slowing the progress of introgression at this point.

Thus, the workshop provided a comprehensive scientific overview of our state of understanding of the FecB gene in sheep and its practical application around the world. There were 28 papers presented comprising 19 invited review papers and nine short contributions.

All papers have been peer reviewed and are currently in the process of being published as an ACIAR monograph.

## Prof. Goverdhan Mehta delivers CECRI Diamond Jubilee Lecture

**P**rof. Goverdhan Mehta, FRS, CSIR Bhatnagar Fellow and Honorary Professor of Indian Institute of Science, (IISc), Bangalore, delivered the Central Electrochemical Research Institute (CECRI), Karaikudi's Diamond Jubilee Lecture on 6 October 2008 on 'Chemistry for a Better Future and Inspiration from the Past'. The agenda of his talk included Celebrations of Chemistry, Directions and Challenges, Reflections and Inspi-

rations, Indian scenario etc.

Prof. Mehta quoted very popular quotations of Great Chemists in his lecture, explaining the transitions from alchemy to modern science. The evolving perception of chemistry commences from discovery, followed by understanding and creation of machines and molecules. He said that by understanding molecular structure we can create (design) molecules. He narrated the ever expanding canopy of chemistry that includes

materials to medicines, nanotechnology to sustainable energy, climate research to generic modifications and other unmatched interdisciplinary opportunities.

He pointed out that chemistry is a utility science with powerful interface with industry. He mentioned that World Trade in Chemistry in 2004 was \$ 1500 billion and projected it to be over \$ 4000 billion in 2008. Chemicals account for 15% of global



Prof. G. Mehta delivering CECRI Diamond Jubilee Lecture

trade in manufactured goods.

Prof. Mehta highlighted the issues with following concerns:

- Is there any identity? Do we define ourselves too narrowly despite the vast expanse of the discipline?
- Do we project well, the dynamic synergy between the perpetual quests for new structures with unique functions?
- How to reposition chemistry with respect to other

sciences? Do we need to cosmeticize our discipline to amplify its intellectual appeal?

He also suggested the following ways to promote the cause of chemistry:

- Revisit the intellectual landscape promote chemistry as a science for human well being and sustainable future;
  - Harness the potential of the exceptional interface between chemistry and industry;
  - Sharpen the networking skills;
  - Chemistry - as a new bridge to span the increasing charm between science and society.
- Prof. Mehta also traced the long tradition of India in possessing a wide range of natural prod-

ucts and traditional medicines. Nutraceuticals and cosmeceuticals have \$60 billion herbal market.

He concluded his talk by stating the following facts:

- Chemistry continues to draw enough students at both graduate and under graduate levels;
- Signs of incremental improvement in the quality of training and research is visible;
- New institutions are being established with better infrastructure; and
- Job opportunities are available with competitive compensation and emergence of a new breed of entrepreneurs.

Earlier Prof. A.K. Shukla, Director, welcomed Prof. Goverdhan Mehta to CECRI and cherished his long association with him. Dr V. Yegnaraman, Scientist 'G' proposed a Vote of Thanks for Prof. Mehta's ready acceptance of CECRI's invitation to deliver a talk.

## Dr Simon Boxall delivers a Public Lecture on Climate Change at NIO

**D**r Simon Boxall, a senior oceanographer at the University of Southampton, National Oceanography Centre, UK, delivered a public lecture at the National Institute of Oceanography (NIO), Goa, on 16 April 2009. He spoke on 'Climate Change from the Arctic to India - Myths, Facts

and Ways Forward'. The title of the lecture attracted many a youth to be a part of this programme.

During his talk, Dr Boxall shared some of his thoughts about the emerging trends in the climate change research by citing examples from his work in the North Pole and what adverse effects will the melt-

ing of the ice-covers have on the coastal parts of India. According to him, people always respond to situations when they are associated with a sense of immediacy. But climate change and its adverse effects present a gradual threat like slow poison. "Unless we start taking preventive mea-



Dr Simon Boxall delivering his lecture on Climate Change

ures, we will not be in a position to handle the future," said Dr Boxall. Towards the end of his talk,

he stressed the fact that one must start saving energy. He lamented that everyone assumes that cutting back on our CO<sub>2</sub> emissions will necessarily be painful and expensive. "But if one does use less power, having better insulated homes, and more economical transport, we will save money and our environment," he added. In essence, an eco-friendly lifestyle will be beneficial to the societies all over and the planet in general.

Dr Boxall was on tour to India from 14-21 April for a series of lectures on 'Talking Climate' organized by the British Council, across the country. The main aim of this tour was to simplify the

confusion of climate change, which is the greatest threat to mankind. He had travelled to Hyderabad, Ahmedabad and Delhi.

He is the lead scientist for 'Cape Farewell' Programme working together with artists, writers and musicians such as Vikram Seth, McEwan, Antony Gormley, KT Tunstall and Jarvis Cocker. The main purpose of Cape Farewell is to bring forth and convey to public the understanding of climate change from wider perspectives. It is an endeavor of this team to make use of different modes of expression to depict scientific findings so as to aptly appeal the masses.

## Aerofest 2009 at Coimbatore

The first programme of Aerofest in 2009 was organized by the National Aerospace Laboratories (NAL), Bangalore, at PARK College of Engineering and Technology (PCET) during 7-10 March 2009 at Coimbatore. Aerofest is a reach out programme designed to enthuse youngsters. PCET has one of the largest Aeronautical Engineering Departments numbering a total of 400 plus students at various stages of undergraduate studies. The programme is spearheaded by A. V. M. Sheshachari, Director of Aeronautics.

One day knowledge sharing seminar was scheduled on 7 March followed by aerial events on 8 March. NAL's technological exhibition was scheduled for 9 and 10 March. Prior to the Inaugural Function, A.V.M. Chari had ensured that Aakash Ganga team kick-started the event with a magnificent paradrop. Incidentally, the Aerofest 2009 was clubbed with annual Fliegen (a German word meaning Flight) event of PARK.

Dr Mohan Kumar, Principal, PARK, welcomed the gathering. Dr Isaac filled in for Dr Upadhyaya and gave an overview of NAL's role, its mission, programmes and technologies. Dr Ravi, Chairman, PCET, addressed

the gathering and the first thing he talked about, was the *Saras* mishap and paid his tributes to those who lost their lives in the mishap. Considering the cost of *Hansa* he said that it would indeed be nice to see that *Hansa* decorates their college and provides an excellent platform for students to learn to fly. Mrs Anusha, CEO and Mr Kartik, Secretary and technical correspondent of PCET, also spoke on this occasion. Dr Isaac released Aerofest 2009 and Fliegen 2009 souvenir. Group Captain B. K. Dash, Station Commander, Air Force Station, Sulur, also spoke on this occasion, and they made all the necessary arrangements at the Air Force Station.

After inauguration, the technical sessions started off with guest lecture on helicopter aerodynamics by Dr Syed R. Ahmed, formerly of German Aerospace Center (DLR), Braunschweig. Dr Isaac spoke on doing experimental science. A lecture on MAV's was delivered by Dr G. Ramesh of EAD and V. Mudkavi spoke on 'Flight Aerodynamics'. Dr Ranjan later spoke on the 'Acoustic testing programme' at NAL. Dr Ramesh Sundaram of ACD spoke on 'Role of composites'. The seminar ended with a lecture by V. Mudkavi on 'Mod-



elling, Simulation and Equations of Fluid Mechanics'.

MAV flight demonstrations were conducted by the energetic and young MAV team. Soon after, the exhibition team got into high gear and toiled on 9 and 10 March explaining the intricate models and concepts to one and all. The exhibition was inaugurated by Mrs Prema Ravi, patron, PCET, and in addition to other visit was also attended by students from neighbouring colleges, including Tamil Nadu College of Engineering, Nehru College of Engineering, and students from local schools. The prizes were distributed to the winners of Aero Quiz.

In the end, the support and hospitality extended by PCET to NAL was highly commendable. Wing Commander (Rtd) Dr Haran, took extra care in making all the arrangements. As usual, KTMD team headed by Mr Giri Raj saw to it that all things were worked out to its last details and executed with precision. He was assisted by Mr Gopinath Roshan and his team, Arul, Senthil Kumar and Gomathy and her team.

The team held a show at Srinidhi Institute of Science and Technology (SNIST) - Vaughn Institute of Aeronautics and Technology at Hyderabad during 18-20 May 2009.

## RDPD Scientists chosen as International Project Management Assessors

**S**hri Arvind Kumar Kundalia and Shri R. Venkatesh, both working as scientists in R&D planning Division, CSIR, have received a unique honour of working as Project Assessors for International Project Management Association (IPMA), Netherlands, which represents 45 national project management associations on the international level and promotes project management to business and organizations around the world.



Shri A. K. Kundalia

Shri R. Venkatesh

As per the first assignment

Shri Kundalia would be visiting Germany as part of the four member international team (the other team members are from Poland, Germany and Denmark to assess a mega international project.

Shri Venkatesh would be part of a five member international team (the other team members are from Hungary, Turkey, United Kingdom and Netherlands) for assessing a mega project in India.

## CSIR Scientists figure among the Thomson Reuters Research Excellence -India Research Front Awardees

**E**ight of India's leading scientists have been honoured with Thomson Reuters Research Excellence ~ India Research Front Awards for their groundbreaking work and influential contribution to global research and development. The awardees were chosen after analyzing their research work using Thomson Reuters Research Front Methodology to assess their level of influence on specific scientific fields. The awardees are:

**Ayyappanpillai Ajayaghosh of CSIR's National Institute for Interdisciplinary**

**Science and Technology (NIIST), Thiruvananthapuram**, for his contribution to research in supramolecular systems.

**G.P. S Raghava and Manoj Bhasin of CSIR's Institute of Microbial Technology (IMTECH), Chandigarh**, for their contribution to research into MHC class I binding peptides, using SVMHC.

**Aniruddha B. Pandit, Institute of Chemical Technology, and Parag Ratnakar Gogate, University Institute of Chemical**



## Honours & Awards/Appointments

Technology, both of University of Mumbai, for their contribution to research in advanced oxidation processes and techniques.

R. Panneerselvam, Gopi Ragupathi and Abdul Jaleel Cheruth, all from Department of Botany, Annamalai University, for their contribution to research in antioxidant metabolism and defence system in higher plants.

## Dr K. Jayakumar takes over as JS, CSIR

**D**r K. Jayakumar, IAS (SK : 87) has taken over charge of the post of Joint Secretary (Admin.), in Department of Scientific & Industrial Research/Council of Scientific & Industrial Research w.e.f. 20.05.2009 (F/N).

## Two NCL Scientists Bag INSA Medal for Young Scientist

**D**r Amol A.Kulkarni, Scientist, Catalytic Reactor and Separation Unit of the Chemical Engineering and process Development Division and Dr Rajesh G. Gonnade, Scientist, Center for Materials Characterization, both from the National Chemical Laboratory (NCL), Pune, have been selected for the Indian National Science Academy (INSA) Medal for Young Scientist 2009.

Dr Amol Kulkarni is leading a research program on the design of microreactors and exploring their applications for continuous flow syntheses of important pharmaceutical intermediates and also the nanoparticles. He also works on understanding the fluid dynamics and transport phenomena in multiphase reactors. He has been awarded with the Max-Planck-Visiting Fellowship from the Max-Planck Society, Munich for 2008-

2011 and also the Indo-US Science and Technology Forum's IUSSTF Research Fellowship for 2009. He is also a recipient of the Alexander von Humboldt Research Fellowship 2004. Dr Kulkarni has over 30 publications in international peer reviewed journals, 10 in national journals and has presented over 25 papers in international Conferences.

Dr Rajesh G. Gonnade is a chemical crystallographer. His areas of research include polymorphism, solvatomorphism, structural phase transition, solid-state reactions, weak interactions and X-ray charge density studies. Dr Gonnade has over 60 publications in International peer reviewed journals, and has presented over 20 papers in National and International Conferences. He has been also awarded with the JSPS (Japan Society for Promotion of Science) Postdoctoral Fellowship for a period



Dr Amol A. Kulkarni Dr Rajesh G. Gonnade

of two years (2009-2011) to conduct research at Kyoto University, Japan on enantiomeric resolution by crystallization technique.

The Award consists of a Medal, a Certificate and cash prize of Rs 25,000/- along with a start-up research support. The awardees are also entitled for a visit abroad with full support for presenting research work at conferences, and/or participating in collaborative research projects within first five years of receipt of award. The Award will be given in the Anniversary Meeting of the Academy in December 2009.

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