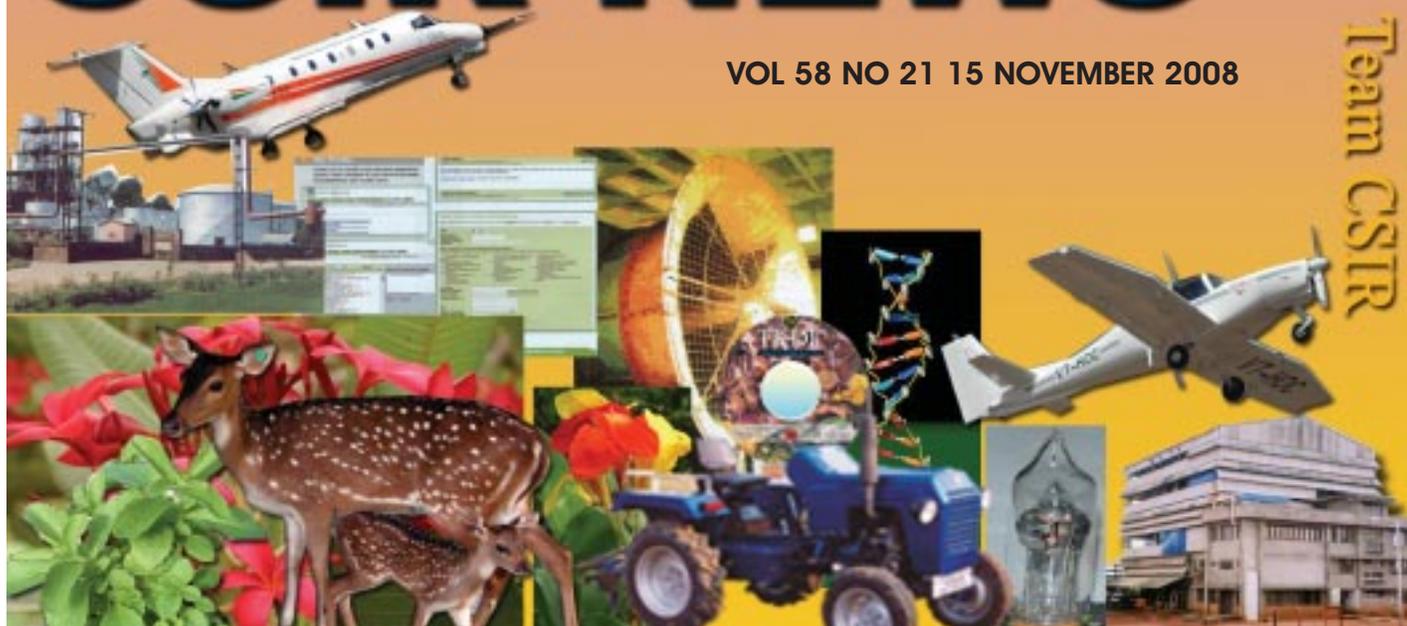


CSIR NEWS

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Team CSIR



Research: Of the People, By the People, For the People

Open Source Drug Discovery launched by Shri Kapil Sibal, Minister for S&T and Earth Sciences

The Hon'ble Minister for Science and Technology and Earth Sciences, Shri Kapil Sibal officially launched the CSIR-led innovative 'Open Source Drug Discovery' (OSDD) programme on 15 September 2008. OSDD has been launched to combat the scourge of infectious diseases that afflict the developing world. It is a CSIR-led consortium with global partnership. Its vision is to provide affordable healthcare to all, especially to the weaker sections of global populations. It draws inspiration from the success of open source movements in software and the Human Genome Sequencing Project. Thus, OSDD is truly a novel and path-breaking initiative.

The traditional patent-driven model, valuable in many fields, has failed to drive research and development of drugs for diseases affecting the developing world. The Open Source model, on the other hand, represents a viable alternative model of drug discovery for infectious diseases. It expands resources for research manifold by allowing open access and collaboration among researchers. Towards this end, CSIR has set up a web portal <http://www.osdd.net>. This portal provides a platform for collaborative research, data on the pathogens, tools for data analysis, and discussion forum for members to share ideas, projects for students to participate in drug discovery, etc. CSIR has given a clarion call to all ignited minds, be they students, researchers, scientists, academicians, doctors, software professionals, traditional healers or industry experts to join the battle against infectious diseases by registering at the OSDD website and sharing their ideas. To encourage students and researchers to participate, problems encountered in drug discovery process will be posted as "Challenges" on the OSDD website. Each problem will have a pre-determined set of credit points associated to it. The best solutions, as decided by a committee of peer reviewers, will be commensurately rewarded. OSDD rests on three cardinal principles of Collaborate, Share & Discover. It aims to bring openness and collaborative spirit to the drug discovery process with the objective of keeping drug cost low. The potential drugs will be made generic as soon as they are discovered. This will enable pharmaceutical companies to bring the medicines to the market, and yet keep drug prices competitive.



In the first phase, drugs against Tuberculosis (TB) bacillus (*Mycobacterium tuberculosis*), will be undertaken. Tuberculosis is the leading cause of death from bacterial infection. WHO reports that one-third of the world's population is currently infected with TB. The estimated incidence of TB in India is 1.8 million new cases annually. An estimated 370,000 deaths due to TB occur each year. This amounts to over 1,000 deaths a day, or 2 TB deaths every 3 minutes. The current TB therapy was developed in the 1960's and no major advancement in treatment has emerged for almost half a century.

In the Eleventh Plan, CSIR has earmarked Rs 150 crore for the OSDD project. An equivalent amount of funding is expected to be raised from international agencies and philanthropists. About Rs 46 crore has been already released by CSIR for this project. Global Research Alliance (GRA) which comprises of governmental/non-

profit research organizations around the world is supporting OSDD.

This largest ever collaborative research project on drug discovery, has :

Chief Coordinator and Mentor:

Prof. Samir K. Brahmachari, Secretary, Department of Scientific and Industrial Research, Government of India. and Director General, Council of Scientific and Industrial Research.

Project Director OSDD:

Dr Zakir Thomas, Head DG's Technical Cell, CSIR.

Project Investigators and Students from:

CSIR Laboratories across India

- Institute of Genomics and Integrative Biology (IGIB), Delhi
- Institute of Microbial Technology (IMTECH), Chandigarh

- National Chemical Laboratory (NCL), Pune
- Central Drug Research Institute (CDRI), Lucknow and others [contact info@osdd.net to join]

Universities and Academic Institutes

- Jawaharlal Nehru University (JNU), New Delhi
- CDFD, Hyderabad and others [contact info@osdd.net to join]

Industries

- Sun Microsystems:
- TCG Life Sciences
- LeadInvent
- Jalaja Technologies and others [contact info@osdd.net to join] Please visit <http://www.osdd.net>

For further details and join the OSDD movement. info@osdd.net

Instrumentation for Snow Avalanche Prediction Parameters' Monitoring

The harsh climate of snow-bound regions, rarefied atmosphere, ever-present threat of avalanches and crevasses make the very survival of living beings an experience by itself. The knowledge of snow parameters is important for climatology, metrology, flood prevention and hydropower industry. Seasonal snow directly affects life of residents by the danger

of avalanches and spring floods in villages living on winter tourism. Snow cover on a slope tends to slide down the slope because of gravity. This sometimes leads to an abrupt and rapid flow of snow, often mixed with air and water, down a mountainside. This is called snow avalanche.

Snowpack properties continuously change with time and have

large variation in temperature, wetness and hardness with respect to depth. Reliable avalanche forecast and prevention requires detailed knowledge of these properties. For this, periodic measurements are necessary to know the values of these parameters to evaluate the trends. For measuring and recording of snow avalanche prediction parameters the Central

Scientific Instruments Organisation (CSIO), Chandigarh, took up the development of following instruments as a sponsored research funded by Snow & Avalanche Study Establishment, a DRDO laboratory:

- IR-based snow surface temperature measuring probe with installation tower.
- Multi-parameter probe for measuring temperature and hardness profile of a snow microstructure.
- Snow moisture measurement system for measuring snow wetness and density.

All the instruments have been designed to work/operate in harsh snow bound conditions. The Indian Institute of Remote Sensing (NRSA), Department of Space, Government of India, has already carried out successful field trials on Multi Parameter Probe and Snow Moisture Measurement System. Snow and Avalanche Study Estt Research and Development Centre, Ministry of Defence, has also endorsed all the three instruments after conducting repeated field trials on these and is using these instruments in their research work.

Technical details and status of each are given below:

IR-based Snow Surface Temperature Measuring Probe with Installation Tower

All the objects emit infrared radiations, which is generated by the vibrations and rotations of atoms and molecules in the matter. As the temperature of object increases, the molecular activity in the object



increases causing the object to emit more radiation. Using this principle, CSIO has designed and developed an infrared technique based snow surface temperature probe/sensor. It has been tested in the field in and around Manali and also interfaced with automatic weather station installed in remote Himalayan region so that data can be received at Chandigarh through satellite. The sensor is used to measure the snow surface temperature using non-contact remote sensing method. The snow surface temperature data is

used in snow cover melting and run off water modeling. The sensor operates in the high relative humidity up to 100% and a wind speed of the order of 200 km/hour.

Field Trials of the probe have been done successfully in and around Manali in

Association with user's Department. CSIO developed systems have been installed at the SASE's observatories in H.P. and J&K region.

Multi Parameter Probe for Measuring Temperature and Hardness Profile of Snow Microstructure

Multiparameter Probe assesses the stability of snowpack by measuring the bonding force between snow grains (vertical to snow layers) with high spatial resolution and high speed. Highly sensitive quartz force sensor and K-type thermocouple are fabricated at the conical tip of the steel rod. A DC



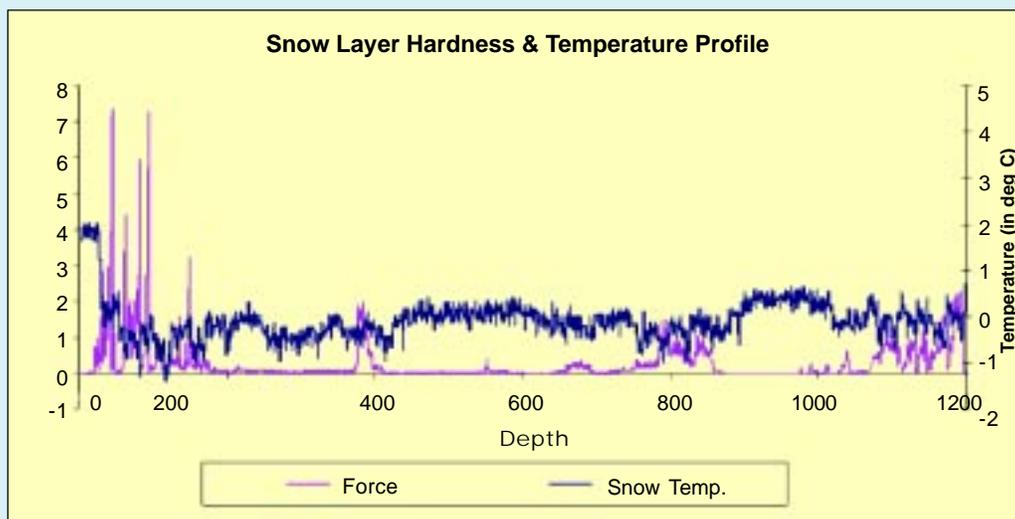
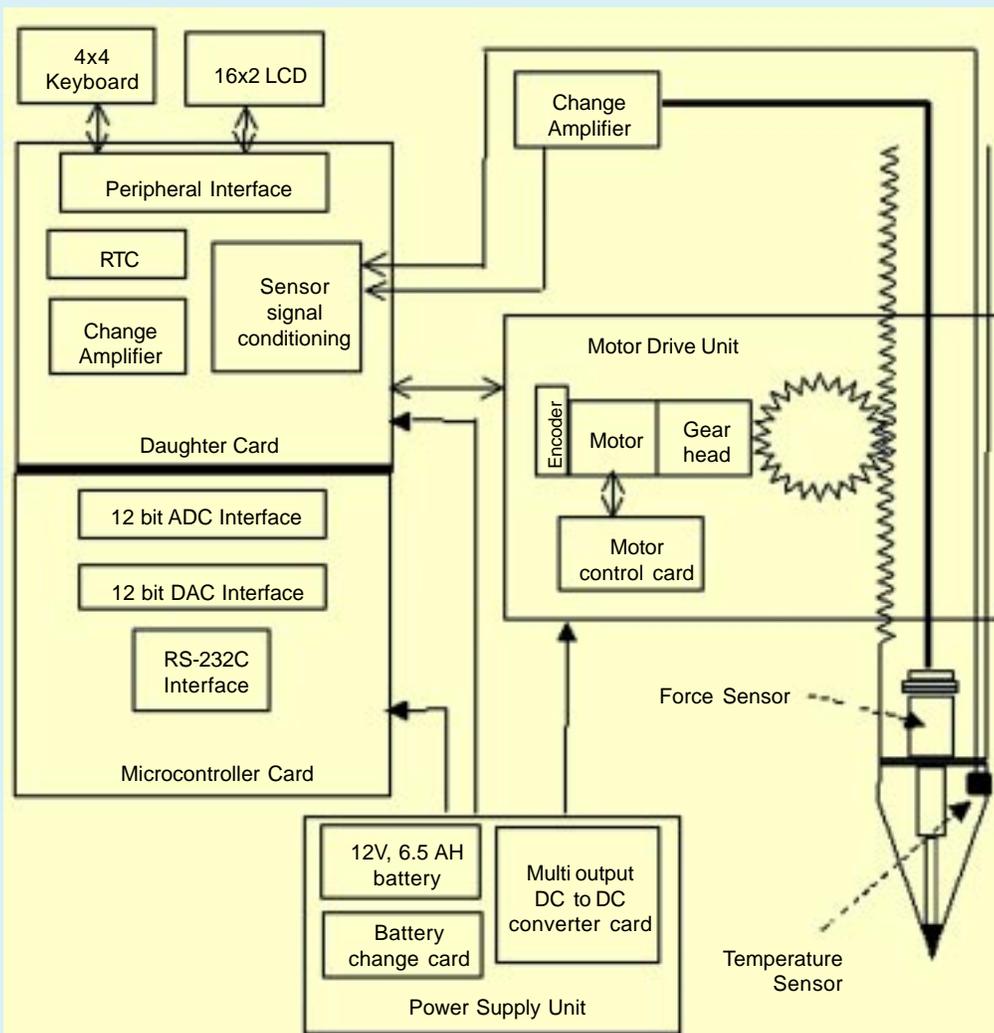
Multiparameter Probe during field trial at Dhundi observatory in Feb 2008



motor of 120 Watt drives conical tip of probe into the snowpack with user selectable velocity (in between 1 to 20 mm/s). The sensors measure the penetration resistance and temperature profile. These parameters are very important in the prediction of avalanche occurrences as well as monitoring the changes in avalanche formation zones at frequent time interval.

Snow Moisture Measurement System for Measuring Snow Wetness and Density

The snow moisture sensor is a fork shaped parallel-wire transmission-line microwave resonator open circuited at one end and short-circuited at the other end. A radio



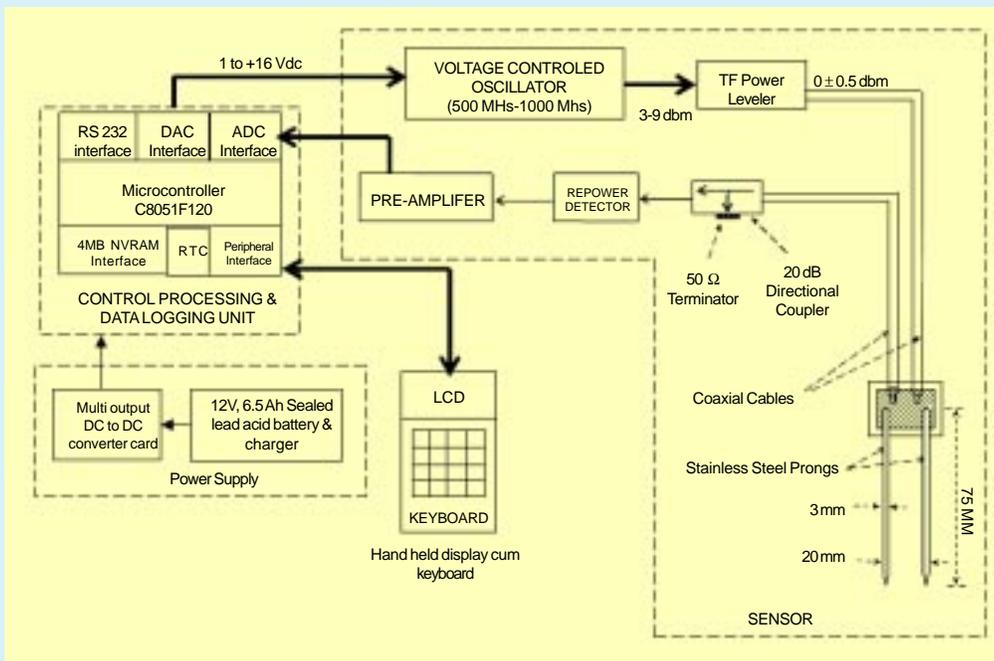
Hardness profile of a snow microstructure taken with CSIO developed MPP



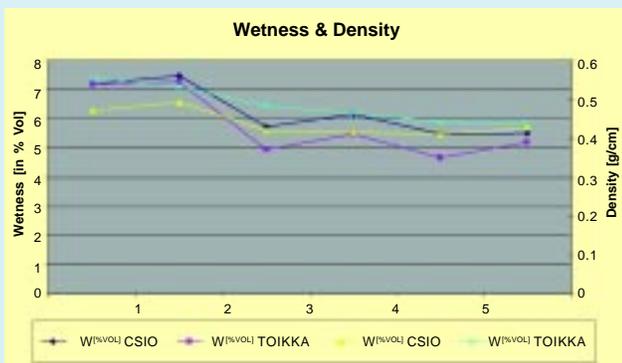
Snow moisture sensor during testing at Findri Nala site (MSP07) near Solang Mar 2008



Snow moisture sensor during field trial at Dhundi observatory area in Feb 2008



frequency sweep (450–950 MHz) generated by a VCO is fed to snow moisture sensor. When sensor is inserted in snow, the real part of the snow permittivity lowers the resonant frequency and the imaginary part broadens the resonance curve, also increasing the attenuation at the resonant frequency. These electrical parameters, i.e. attenuation, resonant frequency and 3-dB bandwidth of sensor are determined which, in turn, are related to the complex dielectric constant of wet snow, the snow moisture and snow density.



Comparative graph showing measurement taken with CSIO developed instrument and imported instrument (Toikka make)



Hydrated Clay for Catalyst Removal in Polymerization Reaction

Scientists at the National Chemical Laboratory (NCL), Pune, have described a simple reaction for the complete removal of copper catalyst from the controlled radical polymerization reaction mixtures using hydrated sodium-clay, a cheap and inexpensive material. The reaction has further benefits in the form of reusability of catalyst and minimizes the metal contamination in the final polymer.

Transition metal mediated atom-transfer radical polymerization (ATRP) process is used to synthesize controlled vinyl polymers and copolymers and copper halide is widely used for its superior efficiency and low cost. However, the use of copper catalyst in high concentration (~2000 ppm) severely limits the commercial application of ATRP. Methods for removing the catalyst after the polymerization include passing through adsorbent material, use of special solvents for separation, extraction, precipitation procedures and new ATRP strategies such as activator generated electron transfer ATRP using reducing agents. In order to remove and recycle the catalyst, several supported ATRP catalyst systems have also been developed recently. Although these strategies minimize the metal contamination in the final polymer to a large extent, often the control and the efficiency of the

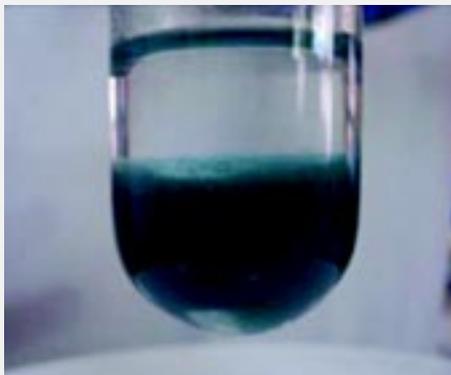


Figure 1: A strong coordination of CuBr-PMDETA (1:1) on Na-clay in the presence of water (H_2O /clay = 25 wt %) in anisole.

catalyst are lost considerably. A large-scale production of controlled polymers and copolymers using ATRP depends on the effective removal of copper catalyst from the reaction mixture. Therefore, a simple and inexpensive method is sought to remove copper from ATRP reaction mixture.

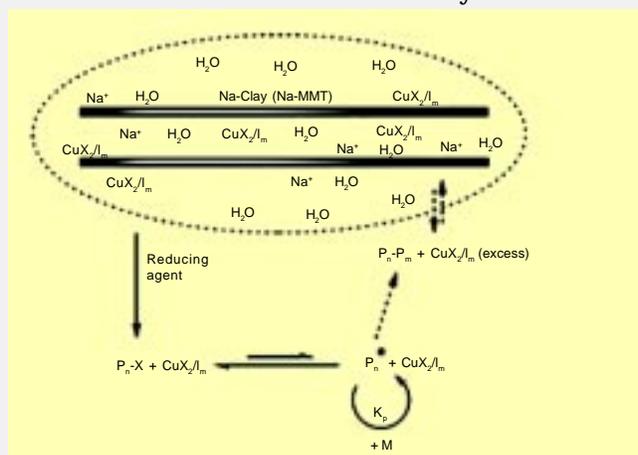
Dr Baskaran and colleagues from Polymer Science and Engineering Division at NCL identified natural clay as a cheap and inexpensive material to remove copper from ATRP reaction mixture. They examined in

details the adsorption and the coordination behaviour of copper on clay in the presence of a small amount of water and found that the hydrated form of sodium-clay referentially coordinates with copper catalyst and thereby removes catalyst completely from the polymerization mixture leaving polymer in organic solution free from catalyst contamination (Figure 1).

The scientists polymerized benzyl methacrylate and methyl methacrylate using ATRP in the presence of hydrated sodium-clay in anisole at 25°C and produced catalyst-free polymer by simple filtration procedure. The recovered clay exhibited expanded intercalary layers and absence of polymer in it. Subsequently, the natural clay intercalated with copper salt complex was used as support for ATRP. They showed that the clay supported-catalyst can be recycled for about twenty times without losing its reactivity to produce consistently polymers with controlled molecular weight and narrow molecular weight distribution (Scheme 1). This work simplifies the catalyst removal operation of ATRP processes and provides new opportunities to produce large scale controlled polymer synthesis using clay supported catalyst.

- D. Baskaran, S. Munirasu; *Indian Patent 1712DEL2007 (10th August 2007)*
- S. Munirasu and D. Baskaran, *Macromolecular Rapid Communication*, 2008, **29**, 1538-1543.

For further information on this work, contact Dr S. Sivaram.



Scheme 1: Hydrated Na-clay supported AGET ATRP for controlled vinyl polymerization.

IICT certified as OPCW designated Laboratory

The Indian Institute of Chemical Technology (IICT), Hyderabad, has been recently certified as a OPCW designated laboratory. It may be noted that the Director-General, of the Organization for the Prohibition of Chemical Weapons (OPCW), at The Hague, The Netherlands, in his letter has appreciated India's continued contribution to the implementation of the Chemical Weapons Convention by the Republic of India. IICT/CSIR is the only Non-Defence lab which has been designated with this rare distinction.

Chemical Weapons Convention (CWC) is an international treaty that prohibits production, storage and use of Chemical Warfare Agents (CWAs) through its verification program. Verification involves on or off-site analysis of samples collected from suspected sites by the inspectors appointed by (OPCW). OPCW is responsible for the implementation of the CWC Treaty. One of the



main responsibilities of the OPCW is to designate laboratories from the member states for the off-site analysis of chemical weapons and their degradation products. There are 190 member countries and 20 designated laboratories all over world, and IICT is one of them. This is a clear contribution of CSIR for the country on the disarmament of the chemical weapons.

To achieve the status of designated laboratory, a laboratory must prove its analytical capability to analyze CWAs and related compounds (CRCs) in Official Proficiency Tests (OPTs) conducted by OPCW. A laboratory which receives three consecutive 'A' grades or two 'A' grades and one 'B' grade gets the OPCW designated status. After obtaining the designated status, the laboratory should maintain 'A' or 'B' grade by participating in OPTs atleast once in a calendar year.

The Center for Analysis of Chemical Toxins (CACT), part of the Analytical Division of IICT has achieved the designated status after it's success in the recently concluded official proficiency test in May this year.

Obviously this is a proud achievement for India and also for CSIR on the eve of its Foundation Day. The Centre for Analysis of Chemical Toxins was inaugurated on the 4 August 2004 (i.e. Diamond Jubilee Day of IICT) by Dr R.A. Mashelkar, FRS, Ex-DG, CSIR, in the presence of Shri Kapil Sibal, Hon'ble Minister for Science and Technology, Government of India.



Prof Samir K. Brahmachari addresses NEERI Staff 'Importance of Leadership'

Visiting the National Environmental Engineering Research Institute (NEERI), Nagpur, on 23 August 2008, Prof. Samir K. Brahmachari, Director General, CSIR, addressed the NEERI staff, on the quality of leadership and importance of NEERI. He said that NEERI has many young scientists but a good leadership is required to tap the potential. NEERI is a unique institute of CSIR which has the potential to become "Arjuna" among the CSIR institutes, he added. Prof. Brahmachari reminded that the institute was renamed as NEERI when the issues related to climate and environment were posing serious concerns to the country. He stated that the institute's role is to ensure how the country can grow with sustainable development and present a model to the world. With the S&T intervention NEERI can pave the way towards sustainable development by tackling various issues related to environment and energy, and become a leader of India. He said that NEERI has capability to grow beyond CSIR and can decide the nation's destiny.

Prof. Brahmachari also spoke about the mentors and leadership that he had when he started his career as a CSIR research fellow at Indian Institute of Science, Bangalore in mid-70s.

In 1995, he was a part of human genome project formulation funded (\$ 3 billion) by United States. Today the human genome sequence is an open source document, he added.



Prof. Samir K. Brahmachari, Director General, CSIR, addressing the NEERI staff

Prof. Brahmachari further said that when the human genome sequence was over, as a Director of Institute of Genomics and Integrative Biology (erstwhile CBT), he launched Indian Genome Variation Project to bring India into the world genomic map and he succeeded in his endeavour. He informed that he has created "G.N. Ramachandran Knowledge Fund" of Rs 1.2 crore with his personal money at the Institute of Genomics and Integrative Biology (IGIB), New Delhi, for providing fellowships to carry out the studies on genomics and integrative biology. Prof. Brahmachari stated that as the world is advancing very fast, CSIR will also have to change its gears in the right direction. He urged the scientists to concentrate on their missions. He lamented that people still do not know what CSIR has

done for the country. He advised NEERI to create knowledge valuation document to assess the performance of the institution.

Prof. Brahmachari also made presentation on a few of the most significant contributions of CSIR. He said that in 1960s CSIR contributed to the development of Amul Baby Food and established the aerospace facility, i.e. wind tunnel. In 1970s, CSIR became a part of green revolution and 70% of the fertilizers produced in India were manufactured based on the CSIR technology. India's first indigenous tractor "Swaraj" was also developed by CSIR, he recalled. In 1980s CSIR developed "Kangra Tea", the technology for cleaning the coal and Mark II pumps which were established in Indian villages. In 1990s, CSIR developed Sonalika

tractors, *HANSA* and *SARAS* aircraft, and made revolutionary changes in DNA fingerprinting and leather technology. Prof. Brahmachari also gave details about the significant CSIR achievements during 2000 - 2006. He informed that CSIR drugs, such as Saheli, E Mal, Abla Quin, Novex, etc. are available in the market. Prof. Brahmachari said that CSIR is adapting to changing needs. He pointed out that CSIR stands for Council of Scientific and Industrial Research with Corporate Social Indian Responsibility. Prof. Brahmachari assured that CSIR would render high science which will empower the farmers in future. Briefing about the new initiatives, he said that affordable health, sustainable energy, potable water and waste to energy are the prime issues on which CSIR will concentrate more by launching the CSIR - 800 programme for betterment of the people in the country.

During the visit, Prof. Brahmachari, also inaugurated Badminton Court and Children's Park in the NEERI residential campus, and held meetings with Heads of various Departments, Achiever's Groups and young scientists. He also visited different laboratories of NEERI.

Workshop on Science, Imagination and Discovery (SID-2008)

The Central Electronics Engineering Research Institute (CEERI), and Birla Institute of Technology and Science (BITS), Pilani, jointly conducted the second nine-day summer science workshop on 'Science, Imagination and Discovery' during 12-20 May 2008. The theme of this year's SID-2008 was "The more you dream, the more you will innovate and discover". The workshop had a participation of 59 school students, aged 12-16 years. This workshop provided the participants a chance to know the latest concepts in the emerging fields of basic sciences such as astronomy, biology, chemistry, mathematics and physics and applied aspects such as biotechnology, material science, MEMS and nanotechnology. It provided them an opportunity to extend their knowledge and discover their individual interests.

SID-2008 started with the welcome address by Prof. Suman Kapur, Chief, Community Welfare and International Relations Unit, the coordinator from BITS, in which she invited the young minds to observe and imagine. She gave examples of young minds whose inventions has made life much easier. "SID-2008 is to inspire you to be the next big inventor," she told the students. A brief insight about the workshop was provided by Prof. L. K. Maheshwari, Vice Chancellor, BITS. Chief Guest on the occasion Dr N. Sarangi, Director, Central Institute of Freshwater Aquaculture (CIFA), Bhubaneswar, elaborated the need of development of science and the opportunities available to the talented students for pursuing a

career in science. Dr Chandra Shekhar, Director, CEERI, highlighted the importance of experimental learning. He added that such workshops present a unique opportunity to young and inquisitive minds.

The workshop had a series of multidisciplinary lectures delivered by scientists and teaching faculty from CEERI and BITS. In all, there were 24 lectures, 11 movies and 10 laboratory visits related to the theme of the workshop. All topics, supported by the slide shows, included: scanning electron microscope, microwave tubes, nanotechnology, chemical compounds, electricity, semiconductor devices, biosensors, forensic science, geographical information systems, energy conservation, robotics and astronomy.

There were interactive sessions where students came up with their questions. Prof. R. K. Mittal, Dean, BITS and his team demonstrated how to design and program robots followed by movies on applications of robotics. Interesting talks on 'Excitement and Thrill of Learning Computer Science' by Mr Raj Singh, Scientist, CEERI and 'Energy for Future' by Mr M. S. Soni from BITS evoked meaningful discussions. Lectures on environment and heat conservation were quite useful for the participants. Students understood the need to protect the environment and also learnt about the green-house effect.

This journey through SID-2008 also had contribution of five BITS students. Other speakers in the lecture series were Prof K. E. Raman, Dr Arya



Kumar, Dr Urvashi Kaushik, Dr Kaushar Vaidya, Dr Ashish Das, Dr Usha Manjunath and Mr Vikas Singh from BITS, and Dr Kamaljit Rangra, Dr G. Eranna and Dr R. K. Sharma from CEERI.

Dr Raghurama, Deputy Director, BITS, told the students about various options available in science and institutes of higher learning. Students were encouraged to sharpen their scientific knowledge and practical approach to day-to-day problems and their solutions. Students were also told about various fellowships available to pursue a career in science.

The workshop provided the students with an opportunity to talk to experts and hone their scientific skills and knowledge in pure and applied sciences. Dr V. K. Dube, Scientist and Coordinator from CEERI, suggested to the heads of the institutes to arrange similar workshops at national level.

The participants received certificates of participation accompanied by a memento and group photograph. Prof Suman Kapur concluded the workshop urging the participating students to master their mind, follow a purpose, practice a lot, live in discipline, respect time, and selflessly serve others.

International Conference on Aerospace Science & Technology



Dr A.P.J. Abdul Kalam, former President of India and Chief Guest delivering the inaugural address.

Seated (from left) are: Dr M.R. Nayak, Adviser (M&A), NAL;

Dr A.R. Upadhyaya, Director, NAL; Dr G.Madhavan Nair, Chairman, ISRO and Secretary, DOS; Prof. R. Narasimha, JNCASR, and Dr Sajeer Ahmed, Chairman, INCAST

As a part of its Golden Jubilee celebrations, the National Aerospace Laboratories (NAL), Bangalore, organized an International Conference on Aerospace Science & Technology at the National Science Seminar Complex at IISc premises, Bangalore, during 26-28 June 2008.

The objective of the conference was to bring together the scientists working in the various sectors such as defence, space, civil aviation, academia, R&D, industry etc, bring out the advances made in the country and elsewhere in the world to the Indian aerospace community, and focus on the future S&T requirements in this critical area. The conference provided a platform for International R&D organizations, academia and industrial agencies to present their latest achievements and to further

explore the possibility of deriving synergies.

The conference was inaugurated by Dr A.P.J. Abdul Kalam, former President of India and one of the most distinguished aerospace scientists in the country. The inaugural function was presided over by Dr G.Madhavan Nair, Chairman, Space Commission, Secretary, Department of Space and Chairman, Research Council of NAL. Prof R. Narasimha, former Director of NAL and Chairman, Engineering Mechanics, JNCASR, Bangalore, released the Souvenir. Dr Sajeer Ahmed, Chairman, Conference Organising Committee, welcomed the distinguished gathering. Dr A.R. Upadhyaya, Director, NAL, introduced the Chief Guest, Dr A.P.J. Abdul Kalam to the audience. Dr M.R. Nayak, Adviser (M&A), NAL,

proposed the vote of thanks.

Dr Kalam in his inaugural address, spoke about his long association with aerospace R&D in the country and informed that the Golden Jubilee Year of NAL also coincided with the 50th year of his association with aerospace. He emphasized the need for effective leadership and enumerated the qualities of a good leader. He also recalled the rapid indigenous growth in aeronautics through development of transport aircraft. He hailed the efforts of NAL to develop a 70-seat transport aircraft RTA-70 incorporating advanced technologies with focus on reduced acquisition, operating and maintenance costs [for Dr A.P.J. Kalam's address please see *CSIR News*, 58 (2008), 210].

Dr G. Madhavan Nair, in his presidential address, hailed the achievements of NAL in the aerospace sector and its efforts towards fostering design and development of passenger aircraft in the country through its *Hansa* and *Saras* aircraft and also its initiatives to design a 70-seat aircraft with latest technologies. Dr Nair also mentioned about the activities of ISRO including the *Chandrayan* Mission.

The conference had six plenary lectures by eminent scientists in the field and 30 invited papers including 17 from abroad in different areas of specialization. The conference had distinguished invitees from international aerospace industries – Boeing and Honeywell; international R&D organizations –

NASA from USA, DLR-German Aerospace Centre; ONERA from France; and the International Academia to present the latest developments in the field of aerospace. The conference also had participants from The Netherlands, Canada, Israel and Brazil. About 117 contributory papers and 50 poster papers were presented in the conference. The areas discussed covered the broad disciplines of aerospace engineering, namely Aerodynamics, Structures, Materials, Aerospace Electronics, Flight Mechanics and Controls.

Propulsion and Parallel Computing, including theoretical, computational and experimental aspects.

The plenary talk by Prof Narasimha brought out the need for an Aeronautics Commission for accelerated growth of aeronautics in the country. He mentioned that though the country had witnessed a boom in the Civil Aviation in the recent years, the boom in Aeronautics was yet to be seen. He recalled the recommendation of late Dr Vikram Sarabhai to the Government of India in 1970's about the need for various Commissions including Space and Earth Commissions and added that only the Aeronautics Commission was yet to be realized.

The plenary talk by Dr Alan Miller on Boeing 787 aircraft was very informative and showed some of the new technologies adopted in design of the aircraft. Prof Inderjit Chopra, University of Maryland, reviewed the state-of-the-art in the

rather complex non-linear rotorcraft aeromechanics and indicated the future trends in R&D and applications. Importance of Aero acoustics and development of CFD codes and the need to bring out the underlying physics was highlighted by Prof. Sanjiv Lele from Standard University.

The plenary talk by Dr A.R. Upadhyya, Director NAL, traced the rapid and remarkable growth of the Laboratory under different Directors during the last five decades and the diversity of its activities and contributions. He concluded with a remark that the NAL will continue to meet the future advanced S&T requirements and needs of national programmes while continuing its efforts in the civil aircraft sector.

Dr Kota Harinarayana, Raja Ramanna Fellow at NAL, in his plenary talk, explained the need for mid size turbo prop aircraft for the country and briefed on the various technologies involved in the RTA-70.

The 117 contributory papers were presented in 32 technical sessions and the 50 poster papers in seven poster sessions. Most of the technical sessions had invited speakers providing the state-of-art in the area. About 450 delegates attended the conference including about 80 students.

A workshop in collaboration with DLR, Braunschweig, Germany on 'Aerodynamics Database Validation and Update from Flight Data', was organized during the conference. An exhibition was also organized to display technologies



and products in the areas of interest to the conference.

During the valedictory function, Dr Sajeer Ahmed, Chairman, Conference Organizing Committee summed up the events and presentations over the three days. He said that efforts are needed to develop collaborations in advanced areas to bring synergy and to economize on time and cost.

Dr A.R. Upadhyaya, Director and Chairman of Golden Jubilee Celebrations said that Golden Jubilee Celebrations have started off well with the successful conduct of this Seminar. He thanked all the speakers and delegates for their active participation, the sponsors for their support, and the Organising Committee and others involved on their committed and enthusiastic efforts.

Prof. Roddam Narasimha delivers Lecture at NAL

on

The *Yukti* of Classical Indian Science

Prof. Roddam Narasimha delivered his birthday lecture, at the Flosolver Lab of the National Aerospace Laboratories (NAL), Bangalore, on the *Yukti of Classical Indian Science*. He started with the intriguing poser: Have you ever wondered why all the science that we learn and practice seems to have originated in the West? Why do our textbooks talk of Newton, Faraday or Gauss, but not of Aryabhata, Brahmagupta or Madhava?

Why is it that the distinctly modern scientific revolution occurred in Europe, and not in India or China? Why, as Joseph Needham asked, did the science of Galileo emerge in "Pisa but not Patna or Peking?" Was there ever a truly Indian science?

Till about 1600 or so (till Newton came along), and for the best part of 14 centuries till then, Indian and Chinese science was actually ahead. But then something went terribly wrong; it was almost as if an entire past was mysteriously wiped out.

In an enthralling lecture, Prof Roddam discussed the likely reasons for the abrupt demise of the golden age of Indian science some 400 years ago. The 'foreign invasions' hypothesis doesn't particularly impress him; the hypothesis that India's caste system may have caused it doesn't win his favour either. "It's really more to do with how Indians did science, about what Indians thought of science ... and in my readings of the history of Indian science there's one word that keeps cropping up: *Yukti*."

Yukti is about putting things together, about unifying, about skillful and ingenious practices ("smart ways" in today's lingo). *Yukti*, Prof Roddam argued, was always

Indian science's underlying paradigm. While the European method was based on hypotheses, generalizations, deductions and abstraction, the Indian method was based on observation, examination and ingenious specific solutions or inferences. What was 'proof' for the Greeks was '*Yukti*' to the Indians.

With *Yukti*, Indian science took impressive strides: it was possible to combat disease, make accurate astronomical calculations, calculate the surface area of spheres, do interpolation and calculus, and even be the first to prove the Pythagoras theorem. But 'general' questions were rarely posed, and solution ideas were never taken to the limits. So when Newton triggered off the West's inexorable wave of learning and scholarship, Indian science was overwhelmed and eventually completely submerged. The fact that, till 1700 or so, the East in general was strong and prosperous, the *status quo* was comfortable, and there was no great internal pressure to change the global order, must also have contributed to hasten the demise.

Prof Roddam's lecture was a brilliant and enjoyable one. There have already been over a dozen of these birthday lectures and each one has been a rich and delightfully fulfilling experience.

Indeed, these lectures offer a wonderful opportunity for NAL and Bangalore to celebrate the eclectic ingenuity of Roddam Narasimha, and to applaud one of India's greatest scholars.

Earlier, Dr A.R. Upadhyaya, NAL Director, welcomed his illustrious predecessor, Prof Roddam Narasimha.

Prof. George M. Whitesides delivers Dr R.A. Mashelkar Endowment Lecture on 'Complexity and Emergence' at NCL

Prof. George M. Whitesides, University Professor of Chemistry at Woodward L. & Ann A. Flowers, Harvard University, USA, delivered the fourth Dr R.A. Mashelkar Endowment Lecture on "Complexity and Emergence" at the National Chemical Laboratory (NCL), Pune, on 19 June 2008. The lecture was organized under the auspices of the NCL Research Foundation (NCL-RF).



Prof. George M. Whitesides delivering the
Dr R.A. Mashelkar Endowment lecture

A number of natural and man-made systems exhibit complex and exotic behaviour that are ascribed to characteristics of nonlinearity. Such nonlinear systems can be classified as (i) complicated systems or (ii) complex systems. Most man-made systems are complicated systems such as making and functioning of a wrist watch, an aircraft etc., said Prof. Whitesides while delivering his lecture.

He further said that a number of different types of components when assembled together in a certain sequence produce a desired output. A failure of any one component in the assembly may result in the overall failure of the system. Issues of robustness are, therefore, important and must be

built into the system at the time of their design. Most natural systems, on the other hand, exhibit complex behaviour.

Prof. Whitesides elaborated his observation by giving typical examples that included the behaviour of termite colony, beehives, ants, biological systems, ecological systems, forest etc. It was noticed that unlike the complicated systems where each component of the element is different, complex systems consisted of similar elements (ants, termites, trees in forest, cells etc). It was the cooperative interactions amongst them that decided the synchronous/asynchronous behaviour of such systems.

The behaviour of complicated

systems has been traditionally expressed using the stately nonlinear dynamical theories. It is believed that a system can be broken down in a stepwise manner to understand clearly the events and its behaviour at finer scales. Elements are thus broken down to their molecules, atoms, electrons etc. The reductionists' approach clearly led to better models of complicated systems; it has, however, also created paradoxes

and cannot explain the cooperative behaviour. Alternative models such as network theories or agent-based strategies are required to explain the complexities generated due to such interactive behaviour. This approach leads to constructionism from cooperative interactions and, hence, referred to as constructionist approach.

This thought, he said, would lead to interesting emergent behaviour that could provide valuable insights into how complex systems function, for example, relatively simple systems like charged particles arranged in the atmosphere in a way as to cause lightning, or extremely complex ones such as living, breathing organisms. Prof. Whitesides provided a model of



maze as a complex system depicting an example of a network of roads in the city. He presented a model of bubbles flowing continuously through micro-channels. Prof. Whitesides demonstrated through video clippings how the size and patterns of these moving bubbles could be tuned through simple engineering parameters, and how their subsequent behaviour showed fascinating periodic properties. Such behaviour could serve as a predictive model for the flow of traffic in a busy city.

Dr S. Sivaram, Director NCL, welcomed and introduced Prof. Whitesides to the audience. Prof. Whitesides has made some outstanding contributions to science, technology and technology-based enterprises, education, public policy and had a profound impact on the field of material science that draws broad inspirations from chemistry, physics, biology and other disciplines of science. Dr Sivaram said that Prof. Whitesides has the distinction of being the scientist with the highest Hirsch Index in chemistry. Prof. Whitesides has authored over 900 publications and has more than 50 patents to his credit. He has co-founded over a dozen companies with a combined market capitalization of about \$20 billion. These companies include Genzyme, GelTex, Theravance, Surface Logix, Nano-Terra and WMR Biomedical besides others. The recurring theme of his research is to address large problems and to convert science to wealth.

US Consul General visits NEERI

US Consul General Mr H.E. Paul Flomsbee visited the National Environmental Engineering Research Institute (NEERI), Nagpur, on 1 October 2008. He had a meeting with Director and scientists of NEERI in which he expressed concern on green house gases and their role in global warming. He also discussed about alternative sources of energy. Mr Flomsbee took cognizance of the status of wastewater treatment in India and environment, health and safety. He explored possibilities of collaborative research with USA in the field of environmental science and engineering.

Dr Tapan Chakrabarti, Acting Director, NEERI, briefed about major activities at NEERI. He specifically pointed out the NEERI's role in remedial action at the Union Carbide Gas disaster taken place at Bhopal. He also informed that NEERI has collaborative projects with various international agencies / organizations like USEPA, ALCOA etc. NEERI scientists also interacted with the US Consul General on this occasion, and shared their research experiences.



US Consul General Mr H.E. Paul Flomsbee in discussion with Dr T. Chakrabarti, Acting Director and scientists of NEERI



US Consul General at the Exhibition Hall of the institute

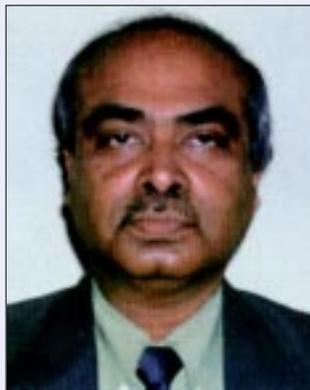


Dr S. Gangopadhyay takes over as Acting Director, CRRI

Dr Subhamay Gangopadhyay, Scientist G, has taken over as Acting Director of the Central Road Research Institute (CRRI), New Delhi, with effect from 2 September 2008

Dr Gangopadhyay obtained his M.Tech from IIT, Kanpur in 1979. He did M.Sc. (E) in 1987 and Ph.D in transportation engineering in 1990 from University of New Brunswick, Canada.

Dr Gangopadhyay joined as Scientist B and rose to become Scientist G and Head of Traffic & Transportation Planning at CRRI. He has worked in the



areas of Traffic Engineering and Transportation Planning with special reference to Traffic Engineering and Management, Transport Planning & Modeling

for Urban and Regional Transport System; Traffic Flow Theory and Capacity Analysis, Road Traffic Safety, Urban Traffic Congestion and Environmental Impact of Road Transport. He has successfully carried out Comprehensive Traffic and Transportation Study for Mumbai, Surat, Amaravati, Nagpur and Aizwal; Urban Road Traffic and Air Pollution and Evaluation of benefits after implementation of Delhi Metro. He has also successfully handled various projects of national importance.

Dr Dwijendra Singh of CIMAP delivers Invited Lecture at XXIII International Congress of Entomology at Durban

Dr Dwijendra Singh, Scientist-F and Head, Entomology Division at the Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow, delivered an invited lecture at the XXIII International Congress of Entomology (ICE 08) held at Durban in South Africa during 6-12 July 2008. The International Congress of Entomology is held in different continents every four years and is globally known to be an important conference relating to all branches of entomology.

Dr Singh who is also an elected



Fellow of the Royal Entomological Society delivered his lecture on pest management in annual crops relating to whitefly resistance potential in mint genotypes and

cultivars of *Mentha* species. The Congress was hosted by the Entomological Society of South Africa (ESSA), and was sponsored by the Department of Science and Technology of the Republic of South Africa (DST, RSA), Department of Agriculture of RSA, ARC of South Africa, Durban South Africa Playground, Durban and ESSA. About 1900 participants from 86 countries participated in the Congress. The main theme of the Congress was *Celebrating Entomology: Contributions to Modern Science*.



Open Access Day celebrated at NISCAIR

**Prof. Samir K. Brahmachari, DG, CSIR
launches IJCA and IJBB in Open Access Mode**



Prof. Samir Brahmachari, Director General, CSIR,
launching IJCA and IJBB in Open Access Mode

The National Institute of Science Communication And Information Resources [NISCAIR], New Delhi, celebrated The First International Open Access Day on 14 October 2008 in most appropriate fashion, by way of making two of its journals open access. On the occasion, Prof. Samir Brahmachari, Director General, CSIR, launched two journals of NISCAIR – *Indian Journal of Chemistry – Section A* and *Indian Journal of Biochemistry & Biophysics* in Open Access mode. The repository is known as: NISCAIR Online Periodicals Repository [NOPR] [<http://nopr.niscair.res.in>].

Currently, the repository has about 2000 articles, of which about 400 articles of above two journals are available under open access mode. Launching of other journals in open access will be taken up gradually for the benefit of the world-wide researchers.

The NOPR is based on the digital repository software-DSpace, and customized according to our requirements. The NOPR implementation strategy is to upload the current year's papers immediately, with gradual addition of previous years' papers.

For further information contact: Dr Vikram V. Agadi
{vva@niscair.res.in}

NIM-2008 — Fourth National Interactive Meet

The Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow, is organizing the biennial event – Fourth National Interactive Meet (NIM – 2008) during 29-30 November 2008. The aim of the NIM is to foster functional linkages between the five major players of the herbal trade viz. farmers, entrepreneurs, financial institutions, end-user industry and research organizations. The major issues for discussion during NIM-2008 will be – prioritization of R&D efforts to generate botanical and chemical reference substances, real time assessment of demand and production scenario, enabling rural masses in herbal trade, strategizing non-destructive harvesting, establishing direct links between small entrepreneurs with end-user and industries and devising modalities for requisite quality certifications.

The two days' programme will cover the theme 'Policies and R&D leads for catalyzing MAPs-based secondary agriculture' on first day and 'Farmers – Industry linkages' on the second day with option of participation accordingly.

The Registration fee (inclusive of Board & Lodging) for the meet will be Rs 2000/- for scientists, entrepreneurs and industries, Rs 250/- for farmers and students.

For further information please contact:

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