



# CSIR News

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## In The News

### Power to Farmers – CSIR-CMERI Small-range Tractor Receives Certification

**K**RISHISHAKTI – a small range (10-12 hp) tractor developed by the CSIR-Central Mechanical Engineering Research Institute, Durgapur – has received CMVR Certification as an Agricultural Wheeled Tractor after rigorous trials and testing. The technology for the manufacture of KrishiShakti has been transferred to M/s Singha Components Pvt Ltd, Howrah, West Bengal.

The new tractor would be a boon for Indian farmers possessing small land holdings. In India, about 85 per cent households cultivate about 36 per cent of the entire cultivable land in the country. The average land holding of the small Indian farmer normally does not exceed even 1 hectare. It is therefore quite difficult for the average Indian farmer to afford mechanized

farming utilizing standard tractors of 35 hp and above ratings, which, in turn, tells upon the productivity and per unit yield.

There has, therefore, been a tremendous demand for developing small, compact and easily maneuverable tractors of rating of 10-12 hp, which are deemed fit for small and fragmented land holdings. KrishiShakti is the latest in the legacy of CSIR interventions in enabling mechanized agriculture and empowering the small farmers. Besides, the small tractor and its matching implements are based on the available diesel engine and tractor parts in the market.



## CIMAP to lead 'Indian Ocean Countries' in Medicinal Plants

CSIR-Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow has been assigned a leading role in the Indian Ocean in introducing a system of certification of medicinal plants and their products to promote marketing and utilization of value-added products in the Indian Ocean Rim Association (IORA) region. This decision was

taken in the first meeting of medicinal plants focal points of IORA Regional Centre for Science and Technology Transfer (RCSTT) held at Salalah, Sultanate of Oman during 23-25 June 2014.

IORA is an apex organization which includes 20 countries including Australia, Bangladesh, Comoros, India, Indonesia, Iran, Kenya, Madagascar, Malaysia, Mauritius, Mozambique, Oman, Seychelles, Singapore, South Africa, Sri Lanka, Tanzania, Thailand, UAE, Yemen and six dialogue partners including China, Japan, Egypt, France, UK and USA.

According to the Salalah declaration adopted by the participating countries, an *ad hoc* committee on standards and standardization for medicinal plants and herbal medicine has been established. The committee chaired by Prof. Anil Kumar Tripathi, Director, CSIR-Central Institute of Medicinal and Aromatic Plants of India and focal points of Malaysia, Iran, Thailand, Seychelles, Sri Lanka, Egypt and the Sultanate of Oman as members, will draft a document to introduce a system of certification of each member state in order to introduce a minimum standard acceptable to all member states for commercialization of value-added products of medicinal plants and related technology in the IORA region.

Prof. Tripathi who represented India at the meeting at Salalah, Oman said that the recommendations made in the meet would help the IORA Member States and other developing countries in formulating their plans to ensure cooperation for applied research, technology transfer and commercialization of medicinal plants and herbal medicine in the IORA region. It was also proposed that CSIR-CIMAP will host a meeting of the IORA in 2015 besides organising an international training course on the processing and quality control of medicinal and aromatic plants for the member countries at CSIR-CIMAP soon.



Prof. A.K. Tripathi (seated from right) in the IORA meeting at Salalah, Oman



Prof. A.K. Tripathi (second from right) in IORA meet at Salalah, Oman

# Bose Institute-Indo FAIR Coordination Center (BI-IFCC) Enters Partnership with CSIR-CMERI for International Mega Science FAIR Project



India signed “The FAIR Convention” as a founder-member country to participate in the design and construction of the Facility for Anti-Proton and Ion Research (FAIR) at GSI Darmstadt, Germany on 4 October 2010. Other partner countries are Finland, France, Germany, Poland, Romania, Russia, Slovenia and Sweden. FAIR will be one of the largest accelerator facilities in the world and also one of the global mega science projects.

The FAIR project is taken up as part of Govt. of India’s Department of Science and Technology (DST) & Department of Atomic Energy (DAE) joint collaboration under an MoU signed between DST & DAE. Bose Institute-Indo Fair Coordination Center (BI-IFCC), Kolkata being an Autonomous R&D Institute under the Department of Science & Technology, Govt. of India has been designated as the Indian shareholder in FAIR Company and the Nodal Indian Institute for management and coordination of FAIR programme in India. The activities of BI-IFCC would be guided by an Executive Council Co-chaired by the Chairman, Atomic Energy Commission (AEC) & the Secretary, DAE and the Secretary, DST.

BI-IFCC has entered into partnership with CSIR-CMERI in the area of “Design and Development of Beam Stoppers for Super-FRS in FAIR Project” due to multidisciplinary nature of the activities in the field of mechanical engineering, beam optics and sensing and control technology. The project will be treated as project of International Importance in the field of advanced technology.



Prof. Sibaji Raha, Director, Bose Institute, Dr. Dinesh Kumar Srivastava, Director, Variable Energy Cyclotron Centre, DAE, Dr. Pijush Pal Roy, Director (Actg.), CSIR-CMERI along with the project leaders and administrative officers during the signing of MoU for formal initiation of the FAIR project on 22<sup>nd</sup> July 2014 at the Bose Institute, Kolkata

The design and analysis of heavy ion beam stopper is extremely challenging in the field of engineering due to the nature of heat dissipation resulting in pressure and shock wave propagation and boundary reflection in the standard absorbing medium. The target specification of a Beam Stopper for fast extraction is with 0.4-1.5 GeV/u primary beam in the order  $\sim 6 \times 10^{11}$  pps (spill), releasing average power within the absorbing medium at 50-100 ns pulse and 1.5s synchrotron pulse cycle over a volume which is estimated by two dimensional Gaussian shape with sigma values along X & Y ( $\mu_x: \sigma_x$ ,  $\mu_y: \sigma_y$ ) and Bragg’s law along Z.

The involvement of CSIR-CMERI in this important international project is an issue of prestige for CSIR. CSIR-CMERI is committed to deliver the desired output i.e. Design and Development of Beam Stoppers for Super-FRS within the stipulated time frame.

## CSIR-National Aerospace Laboratories conferred with Best Laboratory Award 2014



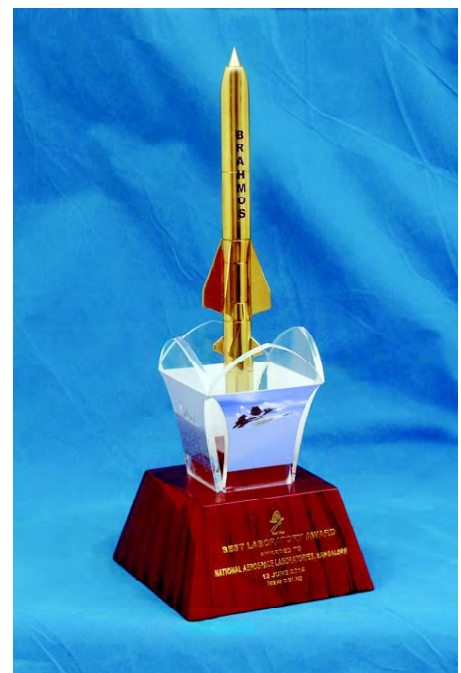
Former President of India  
Dr A.P.J. Abdul Kalam presenting  
the award to CSIR-NAL

Marking thirteen glorious years of the incredible journey of BRAHMOS missile replete with spectacular achievements and successes, India-Russia JV BrahMos Aerospace on 12<sup>th</sup> June 2014 commemorated “BrahMos Day” at its New Delhi Headquarters.

BrahMos has made India a world leader in missile technology with the fastest, high precision supersonic cruise missile, realized in short time with a novel collaborative effort between India and Russia.

CSIR-NAL has successfully carried out the drop tests of BRAHMOS-A from Su-30 MKI model in 1.5 m Low Speed Wind Tunnel to estimate the actual trajectory of the missile at different conditions of the aircraft in a record time. NAL has also successfully conducted the captive and isolated strain gauge tests to generate highly accurate data needed for the BRAHMOS Air-Version project in Tri-sonic wind tunnels. It is noteworthy to mention that the Dynamic Store Separation Trials have been successfully conducted for the first time in the country.

For their breakthrough technology development and outstanding contribution National Aerospace Laboratories has been conferred with “Best Laboratory Award 2014” . Dr. A.P.J. Abdul Kalam presented the Best Laboratory Award 2014 to CSIR-NAL during the celebration of BrahMos Day in New Delhi on 12 June 2014.



## R&D Highlights

# Work on DNA-based Magnetic and Anti-bacterial Material at CSIR-CSMCRI

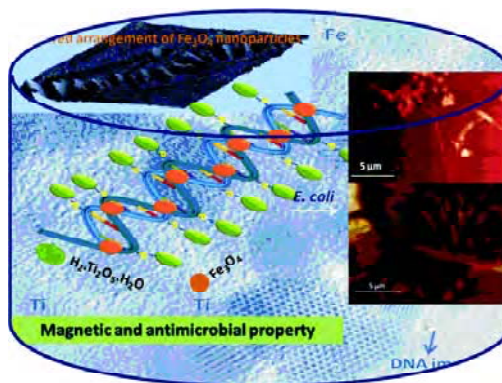


Research on magnetic particles, magnetic microspheres/nanospheres and ferrofluids is focused on finding out their possible applications in various fields in biology and medicine such as magnetic targeting drugs, genes, radiopharmaceuticals, magnetic resonance imaging (MRI) diagnostics. etc. More recently, nanomagnetic materials are emerging for cancer therapies due to their ability to activate mechanosensitive ion channels of tissues.  $\text{Fe}_3\text{O}_4$  is mainly used to prepare magnetic nanocomposites and titanium dioxide ( $\text{TiO}_2$ ) is extensively used in medicine as biocompatible material.

We were successful in solubilizing DNA in bio-ionic liquids and deep eutectic solvents (DESs) with long term chemical and structural stability of the bio-macromolecule.<sup>[1,2]</sup> The DES consisting of the mixture of choline chloride and ethylene glycol (choCl-EG 1:2) was able to solubilize DNA upto 5.5% *w/w*.<sup>[2]</sup> Considering the ability of this DES for DNA solubilization, we have studied suitability of the solvent for dual functionalization of DNA with  $\text{Fe}_3\text{O}_4$  and  $\text{H}_2\text{Ti}_2\text{O}_5\cdot\text{H}_2\text{O}$  (protonated layered dititanate sheets).

The DES thus used was recycled and reused in the process.<sup>[3]</sup> The material thus obtained showed magnetic behavior as well as anti-bacterial activity against four different types of human pathogenic bacteria (both gram positive and negative). Upon chemical investigation it was established that the dititanate sheets have interacted with the phosphate moieties, while the iron oxide nanoparticles interacted with the base pair of the DNA as shown below.

The structural and chemical stability of DNA in a material is very important to utilize its molecular recognition properties and hence the stability of DNA structure in the hybrid material was studied. It was observed that DNA remained stable in the hybrid material for long durations such as six months. This type of material would be useful in biomedical for



Functionalized DNA material having magnetic and anti-bacterial properties

diagnostics applications as well as in cancer therapies.

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## Dr. Kamallesh Prasad

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## Solar Thermal Air Conditioner Designed by CSIR-CBRI

A solar tracker for pyr heliometer (Fig. 1) to track the sun has been designed and fabricated by scientists at the CSIR-CBRI, Roorkee. Bi-axial tracking has been implemented in the solar tracker using two stepper motors. These stepper motors act independently controlled by microprocessor based on Michalsky-Almanac algorithm written for sun angle calculations (Fig. 2). The tracking accuracy attained is 0.0001 degree of the movement of the sun.

Some features of the solar tracker include:

- Ability to track solar azimuth angle and zenith angle separately



Fig. 1. Fabricated Solar Tracker without cover

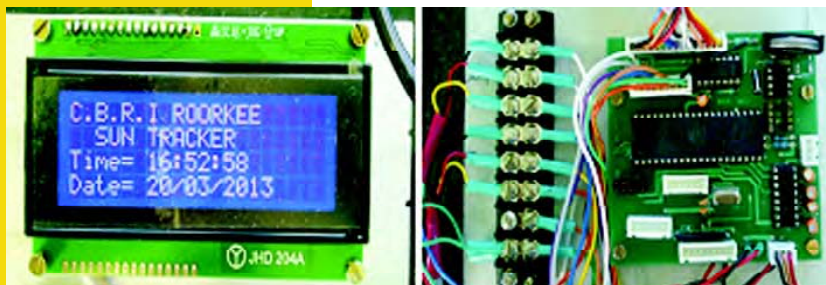


Fig. 2. Solar Tracker – Microprocessor-based electronic control

- Azimuth and Zenith Stepper motors: 25000 steps per revolution
- Azimuth Bearing ratio – 1:100
- Zenith Bearing Ratio – 1:100
- Tracking updates for every second.

**Nagesh Babu Balam**  
CSIR-CBRI, Roorkee

## CSIR-CBRI develops Lightweight Blocks using Industrial Wastes based on Flyash/Rice husk ash/Marble dust

Lightweight blocks have been widely used as building components in the form of masonry blocks, precast units, wall panels, etc. Rising demand of housing complexes and growing cost of conventional building materials like brick and cement has necessitated the development of newer building materials and alternate walling units.

During literature survey on the non-autoclaving of lightweight blocks it was found that no work has been carried out on the use of additives in the development of lightweight blocks. Procurement of raw materials like flyash and rice husk ash has been done from the site. Physical and chemical analysis of the waste materials such as par-

ticle size distribution, surface area, activity index, etc. has been carried out.

For each mix, the weighed quantities required for the constituents are blended thoroughly. Water required for the mixer is added and high-speed stirrer is used for homogeneous mixing for a set period of time. Any content adhering to mixing bowl is cleaned off into the bowl and mixing is carried for another set period of time. Then this mix is poured gently into 100 mm size moulds. These moulds are opened after a certain period of time depending upon the drying condition of the cube. The extra material due to air entrainment is chopped off and leveled. The cubes wrapped with a cloth are

cured in humidity chamber until tested at 28 days (Figs 1, 2 & 3).

Emphasis is on adjusting the doses of additives so that blocks of desired densities can be de-moulded in minimum time. Further, optimization of materials has been carried out and a preliminary block on the desired composition has been done. Some blocks have been cast and their properties like compressive strength, water absorption, thermal conductivity and petrographic, etc. have been evaluated.

**Vivek Sood & Ashok Kumar**  
CSIR-CBRI, Roorkee

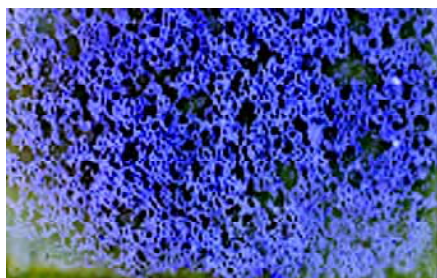


Fig.1. Petrographic study

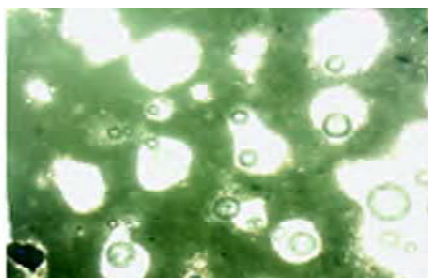


Fig. 2. Microscopic view of CLC section



Fig. 3. 100x100x100 mm cubes under test

### Technologies Released

## **CSIR-IHBT Releases 'Him Stevia' – New Variety of *Stevia rebaudiana***

CSIR-Institute of Himalayan Bioresource Technology, Palampur has developed and released 'Him Stevia', a clonal variety of *Stevia rebaudiana* which has desirable glycoside profile, marking an improvement in utilization of stevia crop as a source of natural non-calorie sweetener. 'Him Stevia' was released by Prof. Samir Bhattacharya, Scientist Emeritus, Vishva Bharati University, Calcutta and Chairman Research Council of CSIR-IHBT, Palampur on the occasion of the CSIR-IHBT Foundation Day celebration on 10 June 2014.

Of the different glycosides, rebaudioside-A has highest sweetening potency and is free of after taste bitterness as in the case of stevioside, which is most



prominent of all the other glycosides. 'Him Stevia' has been selected for higher proportion of rebaudioside-A as compared

to stevioside by a factor of 1.25, thereby making a desirable improvement in the sweetness profile of the plant. The leaves of ‘Him Stevia’ contain 7.34% rebaudioside-

A, 5.87% stevioside and the overall content of steviol glycosides is 14.49% (on dry leaf weight basis). The variety is vigorous in growth and has good adaptability under field conditions giving high leaf biomass yield of 3.68 tonnes per hectare over years.



Field view of ‘Him Stevia’ three weeks after plantation

With the increased incidence of diabetes in India and abroad, and growing concern over the safety of some chemical sweeteners, ‘Him Stevia’ may be considered as a natural non-caloric sweetener with acceptable taste and health properties. The leaves of ‘Him Stevia’ are rich in rebaudioside-A – a high potency, non-calorie and non-toxic sweetener being upto 300 times sweeter than sugar.

The team involved in the development of ‘Him Stevia’ comprises Ashok Kumar Yadav, Sanatsujat Singh, Bikram Singh, Ram Kumar Sharma, Vijaylata, Anil Sood and P.S. Ahuja from CSIR-IHBT, Palampur.

**R&D Facility**

**Dr. T. Ramasami inaugurates Common Facility Centre on Weaving and Textile Product Manufacturing of CSTRI-NEIST centre**

To boost weaving and textile product manufacture in the state through S&T intervention, CSIR-North East Institute of Science & Technology (NEIST), Jorhat with the support of DST, Govt. of India

inaugurated a “Common Facility Centre on Weaving and Textile Product Manufacturing” at New Sonowal Mising Gaon on 16 May 2014. The Centre has been implemented in association with a local



Dr. T. Ramasami, Former Secretary, DST, Govt. of India and Former Director-General, CSIR inaugurating the Common Facility Centre. Dr T Ramasami speaking on the occasion while Dr. D. Ramaiah (left), Director, CSIR-NEIST and Dr. R.C. Boruah (right), Outstanding Scientist are seen seated on the dais

NGO, Society for North East Handmade Paper Development (SNEHPAD).

Padma Bhushan Dr. T. Ramasami, Former Secretary, DST, Govt. of India and Director-General, CSIR inaugurated the centre in presence of Dr. D. Ramaiah, Director, CSIR-NEIST and Dr. R.C. Boruah, Outstanding Scientist, at an inaugural function attended by a large gathering of members from local Self Help Groups, SNEHPAD, local weavers from surrounding places, press and media personnel, besides CSIR-NEIST staff members.

Speaking on the occasion, Dr. Ramasami stressed on the necessity of disseminating technologies that are relevant and useful to the society. Technology for rural people needs special attention from all quarters and the purpose of creating such centres with association of NGOs is to reach out to the people up to the grassroots level, he opined. Dr. Ramasami also informed about similar activities supported by the Department of Science & Technology, Govt. of India in other parts of the country while mentioning

that in its 12<sup>th</sup> Five Year Plan, the Department aims to direct more investment for S&T interventions benefitting directly the weaker sections of the populace.

Mr Prakash Thakur, Secretary, SNEHPAD in his welcome address mentioned the objective and the activities of the facility centre and extended gratitude to CSIR-NEIST for coming up with such a centre for the benefit of the local weavers.

Dr. D. Ramaiah in his remarks urged for the involvement of all to take the benefits of the centre for the upliftment of the society at large. Dr. R.C. Boruah spoke about the genesis of this initiative and the importance of S&T intervention for rural development.

The programme concluded with a vote of thanks by Mr Dipankar Neog, Nodal Scientist of the project, wherein he emphasized that the centre's main aim was to provide opportunities for income generation, skill development and rural development.



## Workshops

### **One-day Workshop “AWAKEN 2014” on Environment & Health organised by ENVIS Centre and CSIR-IICT**

A one-day workshop entitled “AWAKEN” 2014 was organised by ENVIS Centre and CSIR-Indian Institute of Chemical Technology (IICT), Hyderabad on 10 July 2014 on the topic *Environment-Health*. School children of class X and XI numbering 120 were invited from 12 different schools of the twin cities. The Guest of Honour was Dr. Sammaiah (Kakatiya University).

The first talk of the day was delivered by Dr. Ratna Joseph (Chief Entomologist, GHMC, Hyderabad) on the topic *Climate Change and Health Consequences*. He said that health is the biggest wealth of the human race quoting Mahatma Gandhi. Dr. Joseph spoke about the extreme heat conditions prevailing due to global warming and said that we are facing natural disasters and earth

is experiencing variable rainfall patterns mostly due to man-made factors. Due to ozone depletion and melting of glaciers the sea levels are rising due to which in the years to come most of the land will be engulfed and many cities abutting the sea coast would disappear. Much of the population living in these areas would have to be evacuated to safer areas, which might result in onset of communicable diseases and many may suffer from mental disorders due to the catastrophe.

Dr. Joseph suggested a few measures to mitigate the problem including advocacy at the school and college level to sensitize children about environmental degradation, and streamlining the overall health system prevailing in the country to make it more

**Dr. Ramasami stressed on the necessity of disseminating technologies that are relevant and useful to the society. Technology for rural people needs special attention from all quarters and the purpose of creating such centres with association of NGOs is to reach out to the people up to the grassroots level.**

effective by developing a global research agenda.

The second lecture *Environment and Health* was delivered by Dr. Ms. Sabitha of O.U. Women's College Koti. She spoke about the deleterious effects of green house gases due to the depletion of the ozone layer. In her

Orissa State. Arsenic poisoning is quite prevalent in Bangladesh and West Bengal and people are falling prey to Minamata disease by consumption of fish contaminated with mercury. She cautioned students to be very selective and careful in buying fruits like Mangoes and Bananas from the market as they are artificially ripened by carbide, Apples and Strawberries are coated by wax which when ingested would lead to health problems. The abuse of plastics was also highlighted in her lecture.

Dr. Sammaiah (Kakatiya University) spoke about common pollutants like Carbon dioxide, Sulphur dioxide, Hydrogen Sulphide, etc. which cause health hazards. He highlighted that most of the ground water is contaminated and is not fit for drinking— heavy metals like Lead and Cadmium being the main culprits. They enter into the soil due to extensive usage. Water-borne diseases are quite common in the country due to various reasons, one of them being over use of pesticides. Fruits and vegetables we consume have lots of pesticide residues and when these are consumed without proper cleaning we may end up having cancer. He also said that due to pollution there is lot of variance in the climatic pattern and the seasons are not adhering to the prescribed schedule putting the farming community into distress, which leads to escalation of food prices. Dr. Sammaiah said that psychological problems could become prevalent due to

environmental changes.

The last lecture of the day was given by Dr. U.S.N. Murty (ENVIS Coordinator) who spoke on *Integrated Control of Vectors and Vector-borne Diseases*. Dr. Murty spoke about the nuisance created by mosquito vectors by



Glimpses of the workshop

talk she stressed upon the need to have clean potable water as water pollution is quite rampant and most of the population in our country is affected by it. She cited examples of fluorosis in Nalgonda (Telangana), Prakasam (Andhra Pradesh) districts and

spreading deadly diseases like Malaria, Filariasis, Japanese encephalitis, Dengue and Chikangunya. He said that the fight between man and mosquito is going on since long and mankind has been using all sorts of combat and control methods to bring the menace under its grip.

He said that due to climatic change new vector-borne diseases are reemerging with lot of vigour and posing a serious threat to the human race. Malaria is the most dangerous and many African countries are in its grip. Dr. Murty spoke about the role played by CSIR-IICT, ENVIS Centre in the area of vector borne diseases by disseminating information to academicians, students, public health workers, researchers, planners and policy makers. He stressed that community participation would go a long way in controlling the population of mosquitoes and extolled the students to see that there is no

stagnation of water in and around their school and home to prevent mosquito breeding.

A day prior to the one-day workshop students were selected from various schools to participate in the “Elocution and Drawing Competition”. The theme for elocution was “Climate Change” and for drawing competition it was “Environment and Biodiversity”. Both the competitions witnessed very spirited participation wherein the students exhibited their skills in putting forth their ideas. The top three from each category were awarded prizes and certificates. As the competition was tough the judges decided to give consolation prizes and certificates to all the participants of the two competitions.

At the valedictory function the winners of the two competitions were given mementoes and certificates by the Director CSIRT-IICT and the ENVIS Coordinator.



**Due to climatic change new vector-borne diseases are reemerging with lot of vigour and posing a serious threat to the human race. Malaria is the most dangerous and many African countries are in its grip.**

**Dr. U.S.N. Murty**

## **Events**

# **CSIR-NAL organizes National Micro Air Vehicle Flying Competition-2014**

The National Micro Air Vehicle Flying Competition MICAV-2014 was held at the Jain Global Campus, Bangalore during 8-11 January 2014. The event as a part of DRDO/DST sponsored National Program on Micro Air Vehicle (NPMICAV) was organized by the CSIR-National Aerospace Laboratories (NAL) and supported by the Aeronautical Development Establishment (ADE), Bangalore.

The occasion was used for the review of all the projects under the NPMICAV as well as for the user demonstration of some flight vehicles developed under NPMICAV. The 400 participants included the 11 competing teams from various parts of India, the project team of all the projects from NPMICAV and scientists and engineers from national laboratories, academic institutions and private industries.

During the inaugural function on 8<sup>th</sup> January, Mr Shyam Chetty, Director, CSIR-

NAL in his opening remark outlined the objective of the NPMICAV and the role of NAL in this national programme. He said that NAL along with major IITs, IISc, consortium of institutions under NDRF and a few private industries are awarded projects under NPMICAV with an aim to develop fixed, flapping and rotary wing MAV technologies within the country to meet requirements from the strategic and civil sector. Some of the technology areas identified for indigenous development include power sources for endurance and on-board processing with autopilot for autonomous decision-making capabilities including collision avoidance and collaborative operations, secured communications, chemical and biosensors for detection of explosive substances with low vapour pressure.

The Chief Guest, Mr P.S. Subramanyam, Project Director (CA) and Director, ADA

released the souvenir compiled for the event by CSIR-NAL. Mr Subramanyam in his presidential address said MAV is a very interesting and emerging area and is fast spreading across various applications including the societal ones. In his talk he emphasized on the interdisciplinary R&D efforts and said it is necessary to address the challenges of aerodynamics be it a fixed wing, rotary wing or a flapping wing.

been on doing aeronautics as there is a wide explosion of technical possibilities compared to a few years ago. He mentioned that ADE is using the existing platform for innovative technological development. Solar powered UAVs and UCAV are where ADE is embarking upon.

Dr. Chenraj Roychand, President, Jain University opened the event with a flying demo of flapping wing MAV. In his

talk on *Innovation in Education*, he spoke about 3D printing, blue energy, community colleges and also dreams of a driverless car. He said that the world is moving towards multi-polar economy and technological innovations would make life easier.

Guest of Honour, Lt. General V.J. Sundaram delivered the keynote address. He spoke on the *Micro, nano air vehicle to CYBORGS – A new dimension*. Recalling the first US-Asian MAV competition held in 2008 at Agra he said the MICAV-2014 competition has come far ahead in terms of technological innovations and progress. He mentioned about the work on MAV that is being done at different institutions in the country and specially mentioned the good work that is being done in NAL.

The National MAV flying competition had participation from 11 competing teams from industries, academia and government laboratories. Four teams could accomplish the mission. Other teams could not accomplish the mission due to reasons like communication failure, stability of the vehicle and endurance related problems.

A panel discussion was held on the final day followed by a short presentation from representatives of the participants in the competition. The panel discussion was followed by prize distribution.



Glimpses of the event

Guest of honour, Dr. Tamilmani, Distinguished Scientist and DG Aero released the CD of technologies and application of MAVs. In his address he felt unlike major aircraft programmes adequate thrust has not been given to MAVs. He said India has arrived with multiple programmes like PTA, NISHANT, R1 and R2. However, we need to build production capabilities in order to become a technology leader, he said.

Mr P. Srikumar, Director, ADE in his address said the present day students are

## National Technology Day celebrated at CSIR-NEIST



Prof. T.K. Chandrashekhar, Secretary, Science and Engineering Research Board, DST, Govt. of India delivering the Technology Day lecture.

CSIR-North East Institute of Science & Technology (NEIST), Jorhat celebrated the National Technology Day 2014 with a daylong programme on 12 May 2014. Befitting the occasion, a special function was held at the Dr. J.N. Baruah auditorium in which Prof. T. K. Chandrashekhar, Secretary, Science & Engineering Research Board, DST, Govt. of India graced the occasion as Chief Guest and delivered the Technology Day lecture.

The programme was attended by a large gathering of invited guests, distinguished scientists, students and CSIR-NEIST fraternity both retired and existing. “An increase in the number of scientists and investment per scientist is essential for global positioning of Indian science, technology and innovation system at least to upgrade the present position of India to the present level of China,” opined Prof. T.K. Chandrashekhar in his lecture on *Science, Technology and Innovation Landscape*.

Prof. Chandrashekhar also mentioned that increase in the number of Indian scientists who publish at least 1 paper in SCI journal per year is the need of the hour from the base line number of 1,70,000

scientists of India to 7,50,000. This is an attempt to position India as number one in the global economy by 2020 from its present ninth position, he mentioned.

On the occasion, Dr. D. Ramaiah, Director, CSIR-NEIST stressed on the need of S&T intervention to uplift the GDP and per capita income. He greatly acknowledged the contribution of funding agencies in funding research projects of CSIR-NEIST and hoped for more liberal and generous funding in the future to develop the NE region of the country.

Earlier, in his welcome address, Dr. R.C. Boruah, Outstanding Scientist, highlighted the performance of the Institute in terms of commercialization of technologies, patents, research papers, PhD students, and completed projects.

After the programme Prof. Chandrasekhar visited different divisions of the laboratory and also interacted with scientists. Earlier on the same day, Prof. T.K. Chandrashekhar inaugurated the new Girls’ Hostel at CSIR-NEIST campus.

The day was declared as ‘Open Day’ during 2.00 to 4.30 pm for the visit of students and general public.

“An increase in the number of scientists and investment per scientist is essential for global positioning of Indian science, technology and innovation system at least to upgrade the present position of India to the present level of China,” opined Prof. T.K. Chandrashekhar in his lecture on *Science, Technology and Innovation Landscape*.

**Seminar****Indo-UK Seminar on “Molecular Imprinting: Strategies, Applications and Future Perspectives” at CSIR-NEERI**

CSIR-National Environmental Engineering Research Institute (CSIR-NEERI), Nagpur organized a three-day Indo-UK Seminar on “Molecular Imprinting: Strategies, Applications and Future Perspectives” at Hotel Tuli Imperial, Ramdaspath, Nagpur on 5-7 February 2014. The seminar was inaugurated by Prof. Michael J. Whitcombe, Leicester University, U.K., Prof. Ian A. Nichollas, Deputy Pro-Vice Chancellor, Linnaeus University, Sweden, Prof. Yerramilli Anjaneyulu, Jackson State University, USA and Dr. Satish R. Wate, Director, CSIR-NEERI.

Prof. Nichollas said that significant technological developments in molecular imprinting might help to get better results in environmental monitoring and pollution control, and also detection and prevention of various diseases. He urged the scientists to adopt new and improved strategies of molecular imprinting. He assured that the Indo-UK collaboration in the area of molecular imprinting will lead to great success in the interest of the people of both the countries.

Prof. Whitcombe emphasized on the need to spread and promote the latest developments in molecular imprinting to more and more countries through research publications and collaborations.

Prof. Anjaneyulu said that molecular imprinting is a multi-disciplinary area and has great potential to solve various environmental and health problems. He stated that for promoting research on molecular imprinting we need large human resource and proper planning in this regard to achieve the targeted outcome. He advocated that collaboration among various countries will not solve the purpose but various R&D Institutes in the country should also collaborate for achieving a fruitful result in molecular imprinting.

In his welcome address, Dr. S.R. Wate, Director, CSIR-NEERI said that any R&D activity should lead into an application, and molecular imprinting has a huge potential in this regard. He briefed about the applications of molecular imprinting such as chemical sensing, separation science, drug delivery and catalysis.

Technical sessions were held during the seminar in which eminent scientists of UK and India deliberated on various important issues and achievements in the area of molecular imprinting.



Prof. Whitcombe addressing participants during the inaugural function of the seminar

While addressing the participants, Prof. Nichollas said that Molecular Imprinting Technology (MIT) is today a viable synthetic approach to design robust molecular recognition materials able to mimic natural recognition entities, such as antibodies and biological receptors. The design of synthetic materials, which are able to mimic the recognition processes found in nature, has become an important and active area of research in recent years, he added.



## CSIR-CIMAP organises Meet on Vetiver

CSIR-Central Institute of Medicinal and Aromatic Plants (CSIR-CIMAP), Lucknow organised a two-day meet on Vetiver (Khus) on 27 and 28 February 2014. The meet inaugurated by Dr. Dinesh Sharma, Mayor of Lucknow was attended by a large number of farmers, students and representatives from industry and scientists.

multiple uses of this crop and it can be grown both in barren and rain fed conditions.

Dr. Sharma also emphasised the need for training in cultivation of aromatic plants and distillation of the oil before starting large-scale cultivation. He further said that cultivation of these crops and making of herbal products therefrom can solve the problem of unemployment in the rural sector.

Dr. Sharma also planted a sapling of the sacred plant 'Shami' in the campus. Earlier, welcoming the delegates, Prof. Anil Kumar Tripathi, Director, CSIR-CIMAP said that the Institute is serving the farmers and industry through research and development activities in the area of agroand process technologies. He expressed hope that the recommendations of this meet will help in finalising research activities at CSIR-CIMAP.

The technical sessions of the meet were devoted to the current status of production, improved agro-technologies and integration of vetiver in prevailing cropping systems without affecting the yield and production of food crops, development of genetically improved vetiver clones suitable for the current social, economic, environmental and technological needs, processing technologies, chemical studies and quality control and marketing and utilization with special reference to establishing linkages among the stakeholders.



Dr. Sharma delivering the inaugural lecture

Addressing the meet, Dr. Dinesh Sharma lauded the efforts of CSIR-CIMAP and said that by adopting improved technologies in various aromatic and medicinal plants, farmers can increase their income. Discussing the importance of Khus, he said that there are



Dr. Sharma planting a sapling of Shami plant



Dr Sharma looking at a herbal formulation

The Vetiver Meet concluded on 28 February 2014 with several important suggestions and feedback received from the

participating farmers of different states such as Gujarat, MP, Chhatisgarh, Bihar, Tamilnadu, Delhi, Odisha, and Uttar Pradesh.



Farmers after receiving slips of improved varieties of vetiver

## Lectures

### **Dr. Ashok S. Juwarkar Memorial Lecture**

The Dr. Ashok S. Juwarkar Memorial Lecture was organized at the CSIR-National Environmental Engineering Research Institute (CSIR-NEERI), Nagpur in the NEERI Auditorium on 14 July 2014. Dr. Suhas P. Wani, Director, ICRISAT Development Centre, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru (Telangana) was the Chief Guest on this occasion and delivered the Dr. Ashok S. Juwarkar Memorial Lecture 2014.

In his lecture, *Innovations Must Reach Farmers*, Dr. Wani expressed concern over food security with increasing water scarcity, land degradation and growing population. He cautioned that per capita availability of water and land is continuously declining, which is affecting the food production. To overcome this challenge he urged scientists to bridge the knowledge gap between scientists and farmers. He said that agriculture should be adopted like business. Apart from offering assistance to farmers, they should be exposed to innovations in the field of agriculture, he said.

Dr. Wani advocated a need to adopt high-tech agriculture and multidisciplinary



Dr. Suhas P. Wani, Director, ICRISAT Development Centre delivering the Dr. Ashok S. Juwarkar Memorial Lecture 2014

approach for increasing food production in the country. Scientists should disseminate knowledge to farmers, he added. Dr. Wani deplored that still agriculture has not become a respected profession in the country. We need to develop rural areas, if not done so, the country will not prosper, he said. Dr. Wani said that even now rainfed agriculture has not been utilized to its fullest potential in the country. Rainfed agriculture plays an important role in the Indian economy, he added. Dr. Wani said that we need sustainable

agricultural practices to overcome the present challenges and to ensure food security. Climate change is also a great challenge for food security, he warned.

Earlier, in his welcome address, Dr. Hemant Purohit, Chief Scientist & Head, Environmental Genomics Division

expressed concern over the depletion of natural resources and increasing wastelands. He said that we need to convert wastelands into productive lands to strengthen our economy. He also stated that sustainable environmental and agricultural practices are required in the country.

### Visits

## India Should Lead in the Area of Environmental Science and Engineering: Dr. Jitendra Singh

India should lead in the area of environmental science and engineering, said Dr. Jitendra Singh, Union Minister of State for Science & Technology and Earth Sciences (Independent Charge) on a visit to the CSIR-National Environmental Engineering Research Institute (CSIR-NEERI), Nagpur on 28 June 2014.

During his visit, the Minister, who is also Vice-President of CSIR, went



Dr. Jitendra Singh interacting with CSIR-NEERI scientists

around various R&D facilities of the Institute, including compost facility which has been developed under CSIR-800 programme to create wealth from waste, and emission monitoring and control mobile laboratory, which is capable of real-time air sampling and analysis to timely protect the people from the impacts of air pollution.

The Minister was shown a number of innovative technologies equipped in the emission monitoring and control mobile laboratory (van). He was informed that this laboratory has been developed under the project “National Clean Air Mission (NCAM)” of the Institute. Director, CSIR-NEERI Dr. Satish R. Wate apprised the Minister that the mobile laboratory was capable of performing flue gas sampling, measurement, and controlling various pollutants including metals, particulates, ammonia, NO<sub>x</sub>, SO<sub>x</sub>, and CO. The Minister



Dr. Satish R. Wate, Director, CSIR-NEERI briefing the Minister for Science & Technology and Vice-President, CSIR Dr. Jitendra Singh about the emission monitoring and control mobile laboratory

was also informed that this emission monitoring and control mobile laboratory operates with various facilities that contain numerous analytical instruments, to provide real time, on-site, and validated information related to air quality.

During his visit to CSIR-NEERI, the Minister also interacted with Divisional Heads. The Director, CSIR-NEERI briefed

the Minister about the significant R&D activities and achievements of the Institute, in particular about the lab-to-land achievements/projects, 12<sup>th</sup> Five Year Plan projects undertaken in the interest of the nation and CSIR-800 projects to incubate science & technology (S&T) in the villages and improve the lives of the people through S&T intervention.



## Use S&T for Social Transformation, says Dr. Jitendra Singh on visit to CSIR-NPL

On a recent visit to the CSIR-National Physical Laboratory (NPL), Dr. Jitendra Singh, Union Minister of State for Science & Technology and Earth Sciences (Independent Charge) emphasized on the need to use science and technology as a tool for social transformation. He was accompanied by Dr. P.S. Ahuja, Director General, CSIR.

The Minister interacted with the Divisional Heads and young scientists of NPL after listening to a scientific presentation on the current research and development activities of NPL by the Director of the laboratory, Prof. R.C. Budhani, who emphasized on the emergence of quantum standards of measurements and creation of a world class research laboratory at NPL to house these standards and enable research for their future growth.

Prof. Budhani also highlighted the world-class research in the area of solar energy



harvesting being carried out at NPL under the TAPSUN programme of CSIR. To facilitate this research, a state-of-the-art clean room facility has been created at NPL, he added. Development of other energy-centric technologies, such as fuel cells, lithium ion batteries, thermoelectric generators and solar

thermal energy and state-of-the-art research in the areas of precision time measurements, ultra low temperature physics for spintronics and superconducting electronics were also highlighted as part of the presentation. Prof. Budhani particularly talked about the



ongoing programmes of NPL in understanding the environmental contaminants over the Indo-Gangetic planes and setting up of research facilities in the Himalayas to study propagation of pollutants.

The Minister also visited important R&D facilities of NPL, including solar energy complex, ultra low temperature research laboratory and the new metrology building, which is yet to be inaugurated.

Later, speaking to media persons, Dr. Jitendra Singh called upon the media to propagate the message of science widely particularly to the youth of India so that they take up science and technology as a career. He also emphasized that the children of the

country should be encouraged to visit national laboratories like NPL that have made seminal contributions to the growth of science and technology in the country.

Dr. Ahuja highlighted the standards related research at NPL at the global level. This view was further elaborated upon by Prof. Budhani who outlined the emerging areas of standards and measurement science, such as nano-technology, metrology in chemistry, biomedical instrumentation and quantum metrology. He also emphasized the importance of these areas in health sciences, environmental issues and ultra fast computations and information processing.

## Padma Bhushan Dr. T. Ramasami visits CSIR-NEIST

Padma Bhushan Dr. T. Ramasami, Former Secretary, DST, Govt. of India and DG-CSIR visited CSIR-North East Institute of Science and Technology (NEIST), Jorhat from 15 to 16 May 2014. On the occasion, a special function was held at the Dr. J.N. Baruah Auditorium on 15 May 2014 where Dr. Ramasami addressed the CSIR-NEIST staff members.

CSIR has a special role in the current changing scenario of India in the global science, technology and innovation space. He discussed the scale of transformations in R&D with respect to national objectives and the nation building role of science as an emerging paradigm for socio-economic uplift.

Dr. Ramasami mentioned that though the gross expenditure in R&D or gross expenditure per full time equivalent meets global bench marks and R&D outputs per scientist is also high, still there is a need to invest at least 2% GDP on R&D in the country.

Earlier, Dr. R.C. Boruah, Outstanding Scientist, CSIR-NEIST in his welcome address briefly talked about some activities and achievements of the Institute.

Dr. D. Ramaiah, Director, CSIR-NEIST in his remarks spoke about the Institute's vision in various spheres of activities and acknowledged the role of different funding agencies in supporting the R&D programmes of various Institutes/organizations/academics, etc.

On the occasion, a book *Birds of CSIR-NEIST Campus*, authored by Dr. Mantu Bhuyan, Scientist, was released by Dr. T. Ramasami.



Dr. T. Ramasami delivering the lecture

Delivering a lecture on the topic *Research and Development in Nation Building – Role of CSIR; A Perspective*, Dr. Ramasami opined that

## Exhibition

# CSIR at 'Synergy Howrah 2014'

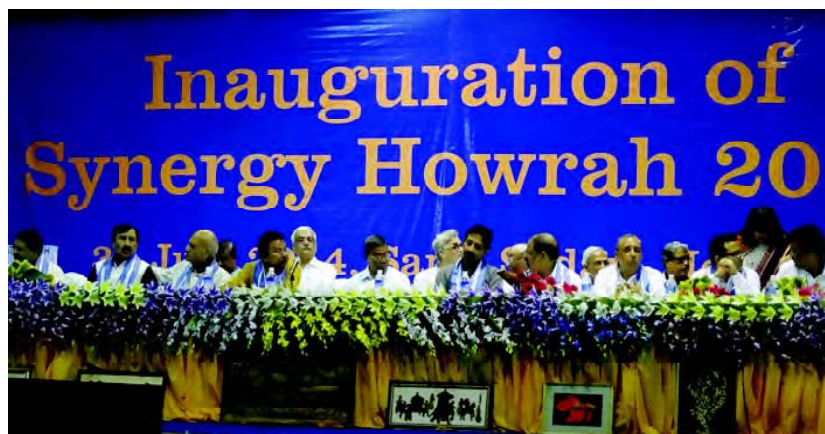
The Council of Scientific and Industrial Research (CSIR) participated in a major way at the 'Synergy Howrah 2014', organized by the Department of Micro, Small and Medium Enterprise and Textiles, Govt. of West Bengal in association with District Administration, Howrah and Howrah Chamber of Commerce & Industry from 31 July to 2 August 2014. The event was inaugurated and organized at 'Sarat Sadan Complex', Howrah Maidan.

In September 2013, a Memorandum of Understanding had been signed between CSIR and the Government of West Bengal regarding the establishment of the MSME-Technology Facilitation Centre (TFC). CSIR-Central Glass and Ceramic Research Institute, Kolkata, is the Nodal Centre for this project and houses the TFC, which CSIR set up together with the Government of West Bengal. This is a pioneering initiative in India. The vision behind the concept is to create a sustainable ecosystem of micro, small and medium enterprises to drive the economic prosperity of West Bengal.

The mission of TFC is to achieve technological enablement of West Bengal's small-scale sector leveraging the prowess of knowledge institutions. TFC acts as single point of access for information. It is mandated to network the knowledge institutions with the MSME sector. It will also take part in policy support and analytics, communication, skill development and training and also assess needs of the MSME sector.

'Synergy Howrah 2014' was the third event in a chain of district-level events that have been planned following the enormous success of 'Synergy MSME 2013' at Kolkata. The event at Howrah was preceded by 'Synergy Siliguri' organized in February 2014.

As is the pattern for the events organized under the Synergy umbrella, various 'Clinics', 'Help Desks' and 'Special Pavilions' were set up to provide all possible assistance and guidance to entrepreneurs. Entrepreneurs and aspiring entrepreneurs were provided information on all aspects of



Dignitaries on the dais during the inauguration

setting up/expanding business. This covered important fields such as: information on availability of land/electricity/mandatory clearances such as Environmental/Pollution clearance, Fire License etc. and Banking/Financial management. The event was planned in such a manner that in just one visit an entrepreneur (aspiring or experienced) could find answers to questions and pointers too, in addition to appropriate technology interventions and mentoring.



The Ambassador of Italy (left) with Mr Rajiva Sinha

The theme of the CSIR Pavilion during 'Synergy Howrah 2014' was **Adopting Clean Processes**. Many of Howrah's industrial units and iron foundry, etc., use traditional methods that have been found to be quite polluting in nature. There is a major problem of effluents and waste management. The need for technology interventions is, therefore, acute. These facts guided the choice of the theme. The components included:

- Clean Fuels and Clean Energy
- Clean Metallurgical Processes and Applications
- Clean Processes for Ornamental Glass

Making

- Clean Environment through Effective Effluent Management

CSIR technologies were showcased in the dedicated Technology Pavilion. Efforts were made to ensure that technologies suitable for the Howrah region were displayed so as to address local needs. Laboratories such as CSIR-National Metallurgical Laboratory, Jamshedpur, CSIR-Institute of Minerals and Materials Technology (CSIR-IMMT), Bhubaneswar, and CSIR-Glass and Ceramic Research Institute (Kolkata and Khurja) deployed personnel to interact with the visitors.

The Multi-fuel portable stove (HARSHA) designed by CSIR-IMMT which is capable of using a variety of solid fuels such as firewood, twigs, leaves, dung, raw coal, briquettes, bagasse and even agricultural wastes, attracted the attention of many visitors.

The popular appeal of the Terafil™ water filter attested to the burning need to access safe water. Terafil™ is a low cost filtration device that can process water rich

in sediments, suspended particles, iron and even some microbes to provide safe drinking water.

Many visitors expressed interest in the products displayed by the CSIR-National Metallurgical Laboratory known for its innovations appropriate for the brassware cluster, in which the traditional practice of melting brass is grossly inefficient, polluting and hazardous. A twin-technology from CSIR-NML was the anti-tarnishing lacquer that could help metals such as Copper, Brass and Bronze to retain their shine over several years. It can be used by manufacturers to coat products leaving the factory and can also be used by the users who have purchased brass items for display. The lacquer is easy to use and can be used at room temperature. There are no health hazards associated with its use.

The Portable Automated Ball Indenter (PABI) from CSIR-NML was also appreciated by the visiting entrepreneurs. The USP of PABI is its ability to estimate hardness, yield stress, yield ratio, tensile strength, strain hardening constant and fracture toughness in just one test.



HARSHA stove



HARSHA stove top view



Ceramic beaad necklace



Glass bead keychain



Brass care Lacquer



Glass bead necklace with mother of pearl buttons



Glass bead necklace



CSIR-CGCRI put the ceramic membrane filters and refractory bricks on display. These items evoked many questions from entrepreneurs. However, the most popular display at the Technology Pavilion was perhaps put up by the Khurja Centre of CSIR-CGCRI. Sparkling glass beads of all colours and shapes fashioned into necklaces and keychains, etc., captivated the imagination of budding and experienced entrepreneurs. There were many queries about the non-traditional uses of these beads and the markets thereof. Interested entrepreneurs clamoured for training in this technology. The use of eco-friendly gas fired kilns interested them. Much of this interest also stemmed from the fact that the technology did not demand heavy investment or large space and was not labour intensive. Entrepreneurs were also interested in designing different items using these beads and their interest was sparked by the earrings and necklaces being fashioned out of loose beads even as they watched.

In addition, details of appropriate interventions available from CSIR

laboratories such as CSIR-National Environmental Engineering Research Institute, CSIR-Central Leather Research Institute, and CSIR-Institute of Minerals and Materials Technology were prominently displayed and evoked interest. Information on Chemo Autotrophic Activated Carbon (CAACO) technology for tannery wastewater treatment and Fenton-activated Carbon Catalytic Oxidation (FACCO) were greatly appreciated. Information about NEERI-Zar was also received well. A video on how modern technologies have benefitted the traditional Howrah Foundry and Re-rolling Industry was also screened on the occasion.

The PRISM (**PR**omoting Innovation in Individuals, **St**art-ups and **MSME**s) scheme of the Department of Scientific and Industrial Research (DSIR), New Delhi, was also showcased at the Technology Pavilion and evoked plenty of interest.

**Dr. Sukanya Datta**  
Senior Principal Scientist  
CSIR-CGCRI, Kolkata

### Honours and Awards

## CSIR-CMERI Scientist gets Outstanding Bio-scientist Award

Dr. K. Kundu, Senior Scientist, CSIR-CMERI Centre of Excellence for Farm Machinery (CoEFM), Ludhiana was felicitated with the 2013 Outstanding Bio-scientist Award by the Association for the Advancement of Biodiversity Science at a conference entitled, *International Conference on Biodiversity, Bio-resources & Biotechnology* held in Mysore on 30 January 2014.

The award has been instituted by the Association for outstanding contributions by bio-scientists in innovative research to shape the future through intellectual and inspired leadership in Bio-fuel Technology.

For a young scientist, it was a great honour to have chaired three sessions of the conference. His presentation on 'Generation of Bio-gas through bio-methanation through de-oiled cake of Jatropha: An alternate path for decentralized power generation' was overwhelmingly received and participants showed a keen interest in his projects.



Dr. Abraham Verghese  
presenting the award to  
Dr. K. Kundu

## Dr. Sourav Pal elected as President of Chemical Research Society of India

Dr. Sourav Pal, Director, CSIR-National Chemical Laboratory (NCL), Pune, has been elected as the President of the Chemical Research Society of India (CRSI). Dr. Pal will be the sixth president of CRSI after dignitaries like Prof. C.N.R. Rao (Founder President), Prof. Goverdhan Mehta, Prof. A. Chakravorty, Prof. V. Krishnan and Prof. S. Chandrasekaran. He took charge as president on 1 April 2014.

Dr. Pal is a distinguished theoretical chemist and has been working at CSIR-National Chemical Laboratory for the last 30 years. He has contributed to diverse areas of theoretical chemistry including the challenging aspects of methodological and conceptual developments. He has contributed to the catalytic and hydrogen storage materials using computational material science.

Dr. Sourav Pal obtained his integrated masters degree in Chemistry from the Indian Institute of Technology (IIT), Kanpur in 1977 and PhD from Calcutta University and joined CSIR-NCL in 1982. He was a post-doctoral fellow at the University of Florida, Gainesville, USA (1986-87) and has been Alexander von Humboldt Fellow at the University of Heidelberg, Germany (1987).

He was a visiting Professor at the University of Arizona, Tucson, USA (1995) and the Institute for Molecular Sciences, Okazaki, Japan (1997).

Dr. Pal has been recognized by several awards and honours for his contribution to science and technology including the prestigious Shanti Swarup Bhatnagar Award in Chemical Sciences in 2000; SASTRA-CNR Rao Award in Chemistry & Materials Science 2014; Prof. R.P. Mitra Memorial Lecture Award, Delhi University, 2010; Dr. Jagdish Shankar Memorial Lecture Award, 2006; CRSI Silver Medal, 2009, and INSA and CSIR Young Scientist Awards in 1987 and 1989, respectively.

He is the Fellow of all three National Science Academies of India. He is also a Fellow of the Royal Society of Chemistry (2011) and J.C. Bose National Fellow of Department of Science and Technology from 2008.

Dr. Pal serves on the editorial boards of several international and national journals in chemistry and has guided over 25 PhD theses. He has published over 200 papers in international peer-reviewed journals. He has been the Director of NCL, Pune for more than three years.



## CSIR-SRF at CSIR-NBRI awarded the best TEM Micrograph Award

Mr Surendra Pratap Singh (CSIR-SRF) at CSIR-National Botanical Research Institute (NBRI), Lucknow was awarded the best TEM Micrograph Award in Life Sciences at the International Conference on Electron Microscopy & XXXV Annual Meeting of Electron Microscope Society of India held at the University of Delhi, Delhi during 9-11 July 2014. The Transmission Electron Microscopic preparation and imaging were done by CSIR-IITR, Lucknow.

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