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In This Issue

121 In The News

- CSIR-NAL Proud to Associate with ISRO's RLV-TD Success
- CSIR-CSIO developed Earthquake Warning System alerted Delhi Metro about Recent Earthquake
- CSIR-CIMAP Releases New Fragrant Variety of Tulsi
- CSIR Launches 'Aroma and Phyto-Pharmaceutical Mission'

126 R&D Highlights

128 MoUs

130 Conferences

130 Workshops

132 Training Programmes

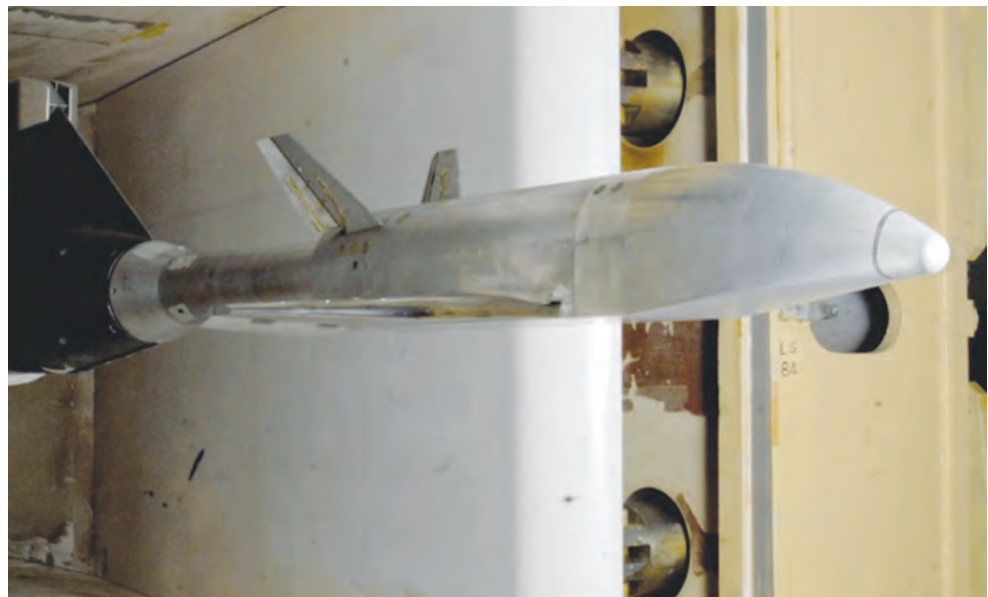
134 National Technology Day Celebrations

141 Visits

143 Honours & Awards

In The News

CSIR-NAL Proud to Associate with ISRO's RLV-TD Success



RLV model used for unsteady pressure measurements at NAL's Wind Tunnel

CSIR-National Aerospace Laboratories (NAL), Bengaluru was proud to associate with the successful launch of India's first Reusable Launch Vehicle-Technology Demonstrator (RLV-TD) by ISRO on 23 May 2016.

CSIR-NAL contributed significantly to the success of the programme. Acoustic tests on the RLV-TD were carried out

at the Acoustic Test Facility (ATF) of CSIR-NAL during April 2016. These tests were primarily to assess the integrity of the vehicle under acoustic loads during the lift-off phase and during the flight through the denser portions of the atmosphere.

The 1.2 m wind tunnel of CSIR-NAL is the major workhorse for all the national

aerospace programmes in India. For the RLV-TD programme, the contributions of the 1.2 m wind tunnel include overall aerodynamic data required for determination of stability and controllability, unsteady pressure distributions for characterization of structural integrity, and pitch and yaw-

damping measurements to determine the response of the vehicle to disturbances. Tests have been conducted in the 1.2 m wind tunnel covering a wide range of angles of incidence and wind speeds up to four times the speed of sound.

The other significant S&T contributions and specialized tests for the programme which are unique and available only at NAL are in the areas of finite element analysis of the engineering model of the RLV-TD and included detailed analysis for structural joints, etc. Work was carried out on panel flutter especially in the high temperature regimes.

RLV-TD structural flexibility interaction with aerodynamics has been qualified through aeroelastic testing at CSIR-NAL for transonic buffet estimation and flutter clearance to ensure safety of the experimental flight. For the first time, NAL developed an indigenous binary Pressure Sensitive Paint (PSP) technology to be applied on the RLV model in wind tunnel tests to obtain surface pressure measurements during the vehicle's ascent and descent under transonic and supersonic conditions.

Based on their vast experience in developing control laws for the TEJAS Aircraft programme, the CSIR-NAL led National Claw Team assisted the design and development of RLV-TD control laws (especially for the descent phase when the flight re-enters the atmosphere) through detailed technical reviews. The team also assisted the VSSC designers in the design and review of the Flush Airdata System (FADS) algorithms, defining the flight test instrumentation for validating the control laws and aero data base, and reviewing the Ironbird which was set up for testing RLV-TD control laws on ground prior to actual flight.



RLV-TD positioned in the reverberation chamber for acoustic test



Ascent configuration of RLV

CSIR-CSIO-developed Earthquake Warning System Alerted Delhi Metro about Recent Earthquake



An Earthquake Warning System (EqWS) developed by the CSIR-Central Scientific Instruments Organization (CSIR-CSIO), Chandigarh recently alerted the Delhi Metro about the 6.8 magnitude earthquake recorded in the Hindukush region in Afghanistan on 10 April 2016.

The CSIO-developed Earthquake Warning System (EqWS) senses and records the event and generates SMS to the concerned action points, in real time.

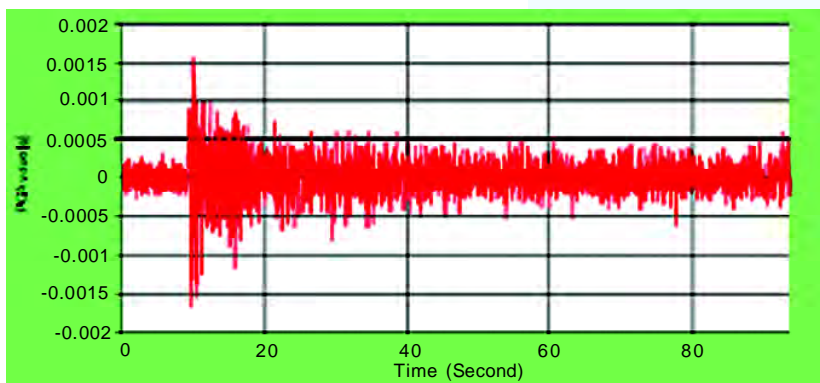
Tremors of this earthquake were felt in various parts of North India including the Delhi-NCR region. The distance from the epicentre to Delhi is approximately 1000 km.

The EqWS consists of five seismic sensing nodes at different locations in Delhi and is in operation for Delhi Metro Rail Corporation since August 2015. This is an outcome of a sponsored project.

The network of five seismic sensing nodes consisting of seismic sensors, communication module, and processing units is devised for regional notification of a substantial earthquake while it is in progress. The five nodes are strategically

located to gather information about seismic activity and communicate it to the central control located at Operation Control Centre (DMRC-OCC) regarding potential earthquake incidence. The central control takes the final decision based on the response of all the individual nodes and generates an audio-visual alarm and sends the event details via email and SMS to the registered users.

CSIR-CSIO has established this network of five nodes at Mundka, Botanical Garden, Huda City Centre, Metro Bhawan and Faridabad, comprising seismic warning systems with LAN connectivity with the DMRC network for generation of alarm signal in case of major earthquakes.



Recorded Seismic Event

Seismic Event Details			
Name of Station	Trigger Date	Trigger Time (IST)	PGA Value (g)
Huda City	10.4.2016	16:01:08	0.00171
Botanical Garden	10.4.2016	16:01:09	0.00218
Delhi Metro Bhawan	10.4.2016	16:01:09	0.00179
Faridabad	10.4.2016	16:01:10	0.0019

Conclusion: Category-LIGHT and PGA Value is 0.00184 g

CSIR-CIMAP Releases New Fragrant Variety of Tulsi



The CSIR-Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow released a new variety of Tulsi or *Ocimum basilicum* on 29 March 2016.

The new variety has a higher aromatic compound compared to other varieties. It will provide aromatic compounds required by perfume, incense and aroma industries in abundance within a short duration.

A new variety of Tulsi named 'CIM-Surabhi' will also provide additional income to farmers as it is a high herb (221.30 quintals/ha) and essential oil yielding (166 kg/ha) variety with 70-75% (-) linalool. Depending on the nature and value of chemicals produced in the plant, a farmer can make an income of Rs 45,000 to more than Rs 1 lakh per hectare for a crop of 3-4 months duration. The linalool in this variety is with 99.14 % purity and is superior to that obtained from lavender. It will be a cheap source of linalool for the aroma, cosmetic, perfumery, pharmaceutical and flavour industries. This would also be helpful in formulating value-added novel industrial products.

Intensive breeding techniques and selection process were undertaken at CSIR-CIMAP to develop such a variety

of sweet basil. Considering the market potential, CSIR-CIMAP has developed industrial varieties rich in specific chemicals to suit the industry and bring rich profits to farmers. "The new variety developed is rich in 'sweet chemical aroma' and has a special fragrance," said Ajit Kumar Shasany, senior principal scientist. The institute has successfully produced eight Tulsi varieties with different medicinal and aromatic uses that include CIM-Jyoti, a variety in which scent of lemon and efficacy of Tulsi have been clubbed together in a single variety.

The variety is used for essential oils with lemon scent. For cosmetic purpose the institute came up with CIM-Sharada rich in methyl chevicol, which could be used in a vast range of beauty products for skin. Kushmohak, a tulsi variety with smell of Khus grass is used in essential oils with Khus grass fragrance, CIM-Ayu has 83% of eugenol which is usually extracted from cloves and has high extraction cost as it's not available in bulk, Vikarsudha tulsi has an earthy smell, a variety of purple colour with medicinal use CIM-Angna and CIM-Kanchan and Somya with variant properties in terms of aroma.

CSIR Launches 'Aroma and Phyto-Pharmaceutical Mission'



Climate change is expected to impact agricultural productivity in the times to come. Farmers involved in traditional agriculture have already begun to feel the changes with many having to flee rural areas after abandoning agriculture.

The Council of Scientific and Industrial Research (CSIR) has now stepped in to support the farmers. CSIR recently launched the 'Aroma and Phyto-Pharmaceutical Mission' to boost cultivation of aromatic crops like lavender, rosemary and lemon grass and medicinal plants like ashwagandha and satavar. Leading the mission will be the Lucknow-based Central Institute of Medicinal and Aromatic Plants (CIMAP), which will spearhead a movement to promote cultivation of these crops especially in unproductive, marginal waste lands including those affected by water scarcity, drought, salinity or flood in Uttar Pradesh, Uttarakhand, J&K, AP, HP, MP, Odisha, Rajasthan, Gujarat, Karnataka, Chhattisgarh, Tamil Nadu, Maharashtra and North Eastern states.

While Prof. A.K. Tripathi, Director, CSIR-CIMAP has been designated as Mission Director by DG-CSIR, the mission will see a collaborative effort by other CSIR institutes including Central Drug Research Institute (CDRI), National Botanical Research Institute (NBRI), and Indian Institute of Toxicology Research (IITR) from Lucknow; Indian Institute of Integrative Medicine (IIIM), Jammu; Institute of Himalayan Bioresource Technology (IHBT), Palampur; North East Institute of Science & Technology (NEIST), Jorhat, and Unit for Research and Development of Information Products

(URDIP), Pune.

Apart from promoting cultivation of medicinal and aromatic plants, the 'Aroma and Phyto-Pharmaceutical Mission' will also make efforts towards processing, value-addition, product development and marketing of medicinal and aromatic plants to boost supply to industries related to aroma business and to the traditional system of Indian medicine.

While the Aroma Mission would focus on various economically important aromatic crops including mint, vetiver, lemon grass, palmarosa, ocimum, patchouli, lavender, rosemary, tagetes, Jammu monarda and valerian, the Phyto-Pharmaceutical Mission will target economically important medicinal plants including kalmegh, ashwagandha, satavar, senna, silybum, curcuma and swertia.

The Mission is hopeful that within the next two years about 6000 hectares of additional area would be brought under cultivation of various aromatic and medicinal crops generating employment among rural youth, and creating trained and skilled manpower leading to an estimated income enhancement of farmers in the range of Rs 25,000 to 75,000 per hectare depending upon the crop they would grow. The Mission will also work closely with leading aroma industries to give a focused orientation and also to promote agri-entrepreneurship in medicinal and aromatic plants.



R&D Highlights

CSIR-NAL Develops Spectrally Selective Coatings for Solar Thermal Power Generation Applications

Efficient solar collector is the heart of Concentrating Solar Power (CSP) technologies for producing solar thermal power. To make an energy-efficient solar collector, its receiver needs to be deposited with high temperature solar selective coating. At present, it is a closely guarded technology held by a few international players.

The National Solar Mission envisages producing 100 GW solar power by 2022, of which ~40% is projected to be produced through the solar thermal route. This would require indigenous development and manufacturing capabilities of receiver technologies along with high temperature solar selective coatings having high

absorptance (α) in the solar spectrum region (0.3-2.5 μm) and low thermal emittance (ϵ) in the infrared spectrum region (2.5-30 μm). Increasing the operating temperature of the receivers reduces the cost of solar electricity. The greatest challenge, however, is to develop a spectrally selective coating which retains its selective optical properties at temperatures $\geq 580^\circ\text{C}$ in air for a prolonged period of time.

Current Level of Technology

CSIR-NAL has developed several high-temperature spectrally selective absorber coatings on coupon level samples (up to 6") using sputtering processes. These coatings exhibit $\alpha > 0.950$ and $\epsilon < 0.08$ on stainless steel substrates and are stable in vacuum for 1000 h at 600°C , and in air for 1000 h at 350°C under cyclic heating conditions. The absorber coating based on a combination of carbides, nitrides and oxides developed on superalloy substrates exhibits an exceptional thermal stability in air up to 600°C

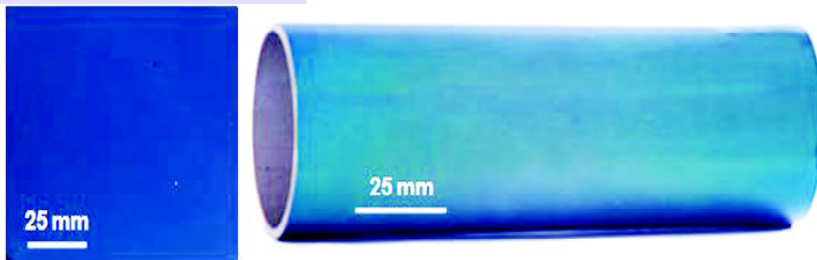
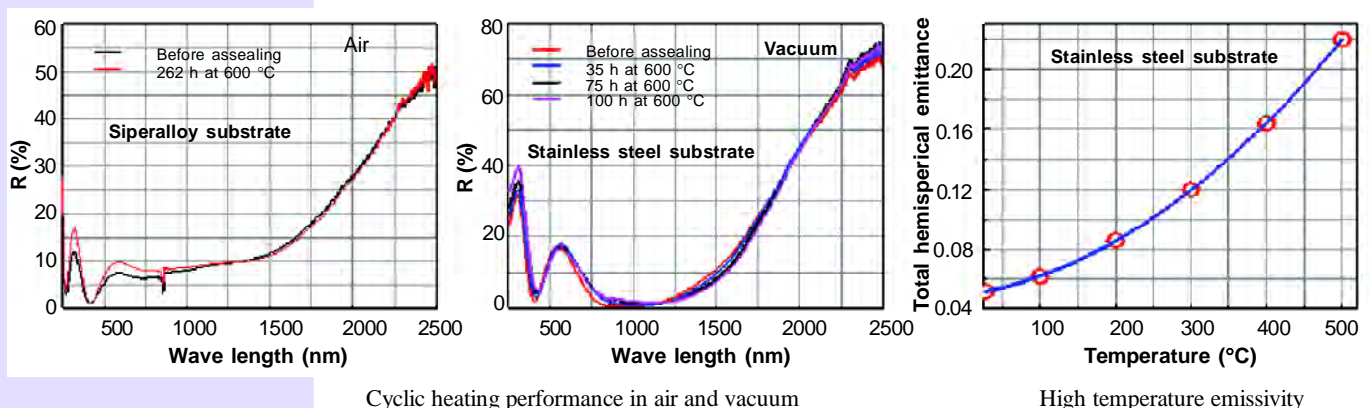


Fig. 1: Photographs of absorber coating on flat and cylindrical samples



Cyclic heating performance in air and vacuum

High temperature emissivity

Fig. 2: Performance of the absorber coatings at high temperatures

under cyclic heating conditions for 262 h, which is the first of its kind and has the potential to be used in receiver technologies without using any vacuum.

The know-how for development of technology for commercial production of the absorber coatings is available with CSIR-NAL.



Optical Properties of Spectrally Selective High-Temperature Absorber Coatings

Coating Type	α	$\epsilon_{82^\circ\text{C}}^*$	Stability (Temperature / Time)	
			Air	Vacuum
TiAlN/TiAlON/Si ₃ N ₄ (USP/07,585,568)	0.950	0.07	600°C/2 h	-
AlTiN/AlTiON/AlTiO (PCT/IN2012/000451 & 000549)	0.955	0.08	-	600°C/100 h
TiAlSiN/TiAlSiON/TiAlSiO (PCT/0182NF2013)	0.954	0.07	350°C/1000 h	600°C/1000 h
TiAlC/TiAlCN/TiAlSiCN/ TiAlSiCO/TiAlSiO	0.961	0.07	325°C/300 h	600°C/100 h
Carbide/nitride/oxide-based coating (Patent to be filed)	0.936	0.15	600°C/262 h (continued)	-

CSIR-IGIB Scientists come up with Peptide Mediated Topical Delivery of Nucleic Acids in Skin

Skin is the largest organ of the human body. Its large surface area and easy accessibility as well as the advantage of easy monitoring of the after-effects of treatment makes it an attractive choice for delivery of different kinds of molecules for both pharmaceutical (i.e. as a drug) and cosmeceutical (i.e. for skin beautification) purpose.

Two modes of delivery are predominant: topical (to skin) or transdermal (through skin) - depending upon the final destination of these molecules. Topical delivery is required when one attempts to treat skin diseases e.g. psoriasis, atopic dermatitis, vitiligo or melanoma or for treatment of conditions like wounds or sunburns or even for application of cosmetics. Transdermal delivery is required when one needs to

send drugs through the skin into the dermis in order to go into circulation and reach some other affected organ.

However, drug delivery to and through the skin poses its own challenges. Skin allows favorable entry of small molecules which are less than 500Da in size and lipophilic in nature that can passively diffuse whereas all others usually need active carriers or physical interventions for transport. The complex skin architecture makes it very difficult for large biomolecules to pass to or through the skin. In most cases, harsh physical or chemical techniques are used for drug delivery to skin leading to toxic effects.

We have developed an amphipathic peptide that can not only penetrate the uncompromised skin and efficiently enter

skin cells but can also deliver plasmid DNA efficiently by forming nanometric complexes without any additional physical or chemical intervention. We observe efficient gene expression up to the highly proliferating basal layer of the skin without observing any adverse reactions or toxic effects after delivery of reporter plasmids.

Our data indicates that entry mechanism possibly involves reversible modulation of junction proteins in the skin along with transient changes in skin structure. This peptide is likely to also find use as an efficient transporter of

therapeutic nucleic acids and possibly other drugs to skin.

Manika Vij, Poornemaa Natarajan, Bijay Ranjan Pattnaik, Shamshad Alam, Nidhi Gupta, Deenan Santhiya, Rajpal Sharma, Archana Singh, Kausar Mahmood Ansari, Rajesh S. Gokhale, Vivek T. Natarajan, Munia Ganguli.

Non-invasive topical delivery of plasmid DNA to the skin using a peptide carrier. *J Control Release*; January; 2016 ; doi: 10.1016/j.jconrel.2015.12.017. Epub 2015 Dec 14.

Reported by S. Ramachandran, Scientist, CSIR-IGIB (Courtesy: Pulse CSIR-IGIB Digital Magazine, March 2016)

MoUs

CSIR-IICB inks MoU with NRDC to Promote Entrepreneurship



The Kolkata-based CSIR-Indian Institute of Chemical Biology (IICB) recently entered into a Memorandum of Understanding (MoU) with the National Research Development Corporation (NRDC) to promote entrepreneurship. The MoU was signed in the presence of Dr. Harsh Vardhan, Minister of Science & Technology.

The CSIR-IICB is known for its

research on diseases and biological problems of global interest. To spin out these R&D outcomes and with a view to contribute to the country's start-up movement, CSIR-IICB has established a translational research unit of excellence (TRUE) which includes an incubation centre of about 10,000 sq ft. TRUE and the incubation centre will help in research getting translated into viable products.

Dr. H. Purushothamam, chairman and managing director of National Research Development Corporation, was happy that the partnership between NRDC and CSIR-IICB would contribute to the 'Start-up India' and 'Make in India' missions of the Government of India by way of promoting entrepreneurships, incubation, IPRs, technology transfer, etc. He said that NRDC has rich experience in these areas over six decades and has executed about 5000 technology licence agreements with industries so far.

Conferences

Round Table Conference on Structural Issues in Prefab Housing Organised by CSIR-CBRI, Roorkee

A Round Table meeting on “Structural Issues in Prefab Housing” was jointly organised by CSIR-Central Building Research Institute (CBRI), Roorkee & Hindustan Prefab Limited, New Delhi on 11 March 2016. Delegates from construction industries, government bodies, research and academic institutions participated in the meeting.

Presentations were delivered by Dr. A.K. Mittal, Pr. Sc. CSIR-CBRI; Dr. K.P. Jaya, Professor, Anna University; Dr. Selvi Rajan, Scientist G, CSIR-SERC & Dr. Y. Singh, Professor IIT Roorkee.

The central deliberations of the Conference revolved around the need to construct 20 million houses for the urban poor as outlined by the Govt. of India under the Pradhan Mantri Awas Yojana (PMAY) till 2022 through prefab technology.

The Roundtable Conference was attended by representatives of HPL, CSIR-CBRI, Anna University Chennai, IIT Mumbai, IIT Delhi, IIT Roorkee, BIS, CPWD, L&T, TCE, Architects, Consultants, Developers and others from all over India. Discussions were held on hybrid connection of prefab structure and formulation of BIS codes for Pre-cast Concrete Buildings, Seismic issues and R-factor keeping ductility in consideration besides the methods for safe and fast construction.

The conference concluded that all the bodies present will be associated in a group for formulation of technology advancement and upgradation to fulfill the promise of the Prime Minister vision of constructing the desired number of houses.



Workshops

CSIR-SERC Organises Workshop on Geopolymers for Sustainable Eco-friendly Infrastructures (GeoSEI-2016)

A one day Workshop on ‘Geopolymers for Sustainable Ecofriendly Infrastructures (GeoSEI-2016)’ was held on 23 March 2016 at CSIR-Structural Engineering Research Centre (SERC), Chennai.

The workshop was inaugurated by the Director, CSIR-SERC. Dr. P.S. Ambily and Shri. S. Sundar Kumar, Scientists, Advanced Materials Laboratory (AML), CSIR-SERC were coordinators of the workshop. Dr. S.S.

Amritphale, Chief Scientist, CSIR-AMPRI, Bhopal, Prof. N.P. Rajamane, Head, CACR, SRM University, Chennai, and Dr. P. Siva Prasad, Vice President, Research, Kiran Global Chemicals Ltd, Chennai, delivered lectures on various topics related to geopolymers.

Dr. P. S. Ambily and Shri. S. Sundar Kumar, Scientists and Shri. V. Srinivasan, Senior Scientist, AML, CSIR-SERC delivered lectures related to geopolymer research being carried out at CSIR-SERC.

Prof. Joseph Davidovits, Geopolymer Institute, France, delivered a talk on 'False values on CO Emission for Geopolymer 2 Cement/Concrete

Published in Scientific Papers', through Video Conference.

About 30 participants from Industries, Air Force and research scholars from various Universities attended the workshop. A demo preparation of user-friendly geopolymer concrete was held at AML, followed by a brainstorming session and panel discussion. The workshop was held as a part of the SUSMAS project. The information shared during the workshop was well received by the participants who felt that more such programmes need to be arranged for the benefit of researchers and the civil engineering community.



CSIR-CFTRI Organises Workshop for Street Vendors in Mysuru

The CSIR-Central Food Technological Research Institute (CFTRI), Mysuru organized a workshop on 'Ensuring Safe Street Food in India's Cleanest City' on 17 March 2016, at the CSIR-CFTRI campus. Street vendors of Mysuru were the focus of the workshop where CFTRI scientists shared tips on making street food nutritious, safe and hygienic.

Over 100 street food vendors took part in the workshop which was in collaboration with the Mysuru City Corporation (MCC) and the Mysuru Street Vendors' Association. The programme was aimed to benefit both street vendors and consumers.

Inaugurating the workshop, MCC Commissioner C.G. Betsurmath asked street vendors operating in non-core areas to ensure safe and hygienic food, and



clean vending spots. He said Mysuru had bagged the cleanest city tag for the second time in a row and vendors had the responsibility of keeping the city clean with proper waste disposal system. They should remember that Mysuru is a tourist city and they can play a key role in serving them clean, and safe food.

In his address, CFTRI director Dr. Ram Rajasekharan said the motive

behind the workshop was to train the trainer, create awareness and disseminate basic and essential knowledge to street vendors. He said that despite ensuring tasty, affordable and diverse food to the consumers, street food vendors were often unaware of the best hygienic practices. We need to educate them on how to regulate waste generation in their business and adopt eco-friendly models in their business in the wake of the plastic ban.

The Workshop included presentations on hygienic practices and FSSAI regulations for street vendors; design

aspects for making a model street vending cart, and MCC initiatives for street vendors. Towards the end there was an interactive session between scientists and street vendors. The street vendors also received a kit containing an apron, cap and gloves and food safety information book.

On the occasion, AcSIR doctoral students of CSIR-CFTRI also released findings of their survey on the status of street food in Mysuru. Inputs from around 200 street food vendors along with consumers were gathered by way of a questionnaire as part of the study.

Training Programmes

Summer Programme at CSIR-CFTRI for School Students

A unique Summer School Programme was held at CSIR-CFTRI for students from government high schools of Mysore District, Karnataka from 18th to 29th April 2016. The programme aimed to instil scientific inquisitiveness in children. This program was initiated at CFTRI to enthuse rural children to pursue careers in science.

Four students from five Government schools namely GHS Meghalapura, GHS

Varakodu, GHS Puttegowdana Hundi, GHS Varuna and GHS Siddaramanahundi participated in the programme. The two week programme exposed the students to experimentation, laboratory practices and state of the art instruments.

The students had an opportunity to get hands on experience with machinery & equipment. Motivational lectures and demonstrations by the scientists of the institute invoked a strong positive response from the students. In their own words “it made them spend their vacation time very productively”. The students visited most of the facilities in the Institute. The students had a memorable experience in science as they spent few hours every day at the R&D departments.

The programme provided food and transport for the children. The students had freedom to ask any questions which came to their mind and were encouraged to interact with scientists as much as possible. They were also encouraged to



Summer School participants learning to work in the lab along with Scientists

give lectures on the topics of their choice as to develop self-confidence within them.

The Summer School programme was inaugurated by Prof. Ram Rajasekharan, Director, CFTRI. He urged the students to be curious and cheerful. He motivated them to pursue the subject which they felt tough stating his own example. He advised the children to put extra effort on the subject which they felt were difficult. He thanked the parents and teachers for sending them to CFTRI to learn Science. He wished all the students a very happy learning experience at CFTRI during the course of the programme.

On the concluding day, certificate presentation ceremony was held in the UNU conference hall. During the occasion Scientists, Staff members, Research scholars from CFTRI and Head Mistress and teachers of participating government schools were present. Mr. G.A. Krishna, Chief Scientist, presided over the function and presented certificates and memento to all the participating students.

The students expressed their views on the programme. It was amazing to see how much they had learnt in these two weeks and very comforting to hear that they had thoroughly enjoyed the unique opportunity. As they narrated their experiences, the concept of the programme and successful completion of the programme was very much

appreciated by everybody present.

Speaking on the occasion, Mr. Krishna motivated the students to unleash the potential in them and be bold enough to face the competition as they are the masters of their souls and captains of their destinies. He encouraged the students to choose science as a career.

Speaking on the occasion, the Head Mistresses of schools thanked CFTRI for selecting their school children and providing them an opportunity of learning science with the Scientists. They added this will be an unforgettable experience in their lives and also thanked the Director and requested for many such programmes for government school children. The programme was concluded with a vote of thanks.



Prof. Ram Rajasekharan, Director, CFTRI distributing the education kit to a participant



Prof. Ram Rajasekharan, Director is seen with the participants of the Summer School Programme held from 18-29 April 2016 at CSIR-CFTRI

CSIR-Central Scientific Instruments Organization (CSIO), Chandigarh



The Central Scientific Instruments Organization (CSIO) in Chandigarh held an open day on 11th May 2016 to celebrate the National Technology Day 2016. The Institute kept open its laboratories for the general public.

At a function organised to mark the occasion, Dr. Anil Kakodkar, INAE Satish Dhawan Chair of Engineering Eminence, BARC, Mumbai (Formerly Chairman, Atomic Energy Commission and Secretary to the Government of India, Department of Atomic Energy) delivered the National Technology Day

Lecture on the topic “Technology Vision 2035”. Dr. Kakodkar talked about the vision for technology twenty years hence when there will be zero school dropouts, ubiquitous internet connectivity, zero slums, vertical farming, zero wastage of food, average life expectancy of 80 years at birth, a helipad in every panchayat, every village connected with an all-weather road and digital identity to all citizens linked with health, education, employment and services and speedy and error-free criminal investigation.

He said that technology is the key to comprehensive national power and technology empowers citizens, societies and nations and enables strategic autonomy against restrictive regimes driven by political, economic, and military interests. Dr. Kakodkar also described the roadmap to achieve this vision through establishing science innovation activity centers, mobile science exhibitions, industry internships, new start-ups, research parks, ensuring minimum disparity, accessible quality education, food, energy, raw materials, security, resilient infrastructure, smart governance, modular development, strategic mindset, demand-driven



research, conducive innovation ecosystem and motivation for industry-R&D lab partnership.

In his Welcome Address, Prof. R. K. Sinha, Director, CSIO said that the National Technology Day is celebrated in India on May 11 every year to mark Indian technological advancement. On this particular day, India achieved a huge technological progression. The first indigenous aircraft Hansa-3 was test flown at Bangalore. India performed successful test firing of the Trishul missile on the same day and also executed three successful nuclear tests at Pokhran, Rajasthan.

Dr. Sinha highlighted some of the current focussed activities of CSIO, which include: instrumentation for enhancing agro produce, post-harvest agro needs and processed foods; instrumentation for therapeutic, diagnostic medical devices and rehabilitation of elderly and differently abled population; precision optomechanics and next generation avionics; devices and components based on photonics and nano-technology, instrumentation for National Security, Public Security and Skill Development in the areas of optics, photonics, mechatronics, analytical and biomedical instrumentation.

Dr. Sinha emphasised that CSIO is active in providing technological solutions for improving the quality of human life through design and development of instruments. He was extremely happy to share that in the last one year CSIO had provided over a dozen technologies to the industries like: Digital Green Moisture Analyzer, Electronic Stethoscope, Air-assisted Electrostatic Sprayer for crops, Diffraction Lloyd Mirror Interferometer, Postural Stability System, Induction Motor Efficiency Monitoring System, and Myo-meter.

He highlighted that CSIR-CSIO is in the process of finalization of technology transfer for Portable Reading Machines for Blind, AutoCEPH – a software for 2D Computerized Cephalometric analysis, Energy Management System, Water Quality Monitoring Watchdog Pod, Earthquake Warning System for Metro Rail and Antiglare Filter (AGF) for automobiles.

He said that he hoped to provide many more technological solutions for societal and strategic applications and informed that there was a well chalked out plan to keep the pace of development of new technology and its integration with the existing system and new knowledge creation.



CSIR-Indian Institute of Chemical Technology (IICT), Hyderabad



The National Technology Day 2016 was celebrated at CSIR-Indian Institute of Chemical Technology, Hyderabad on May 10, 2016. Dr. V.K. Subburaj, IAS, Secretary to Government of India, Department of Pharmaceuticals, Ministry of Chemicals and Fertilizers was the chief guest.

Dr. Subburaj delivered the A V Rama Rao Technology Award Lecture on “Drugs and Diseases: An overview”. The function was presided over by Dr. Srivari Chandrasekhar, Director, CSIR-IICT, Hyderabad. Later, Dr. A V Rama Rao, CMD, AVRA Labs Pvt. Ltd., felicitated Dr. Subburaj with a shawl and memento.



CSIR-National Botanical Research Institute (NBRI), Lucknow



CSIR-National Botanical Research Institute, Lucknow, celebrated the National Technology Day on 11th May 2016. The day was observed as ‘Open Day’ and large numbers of students drawn from various local schools and colleges visited different laboratories, viz., Exposition, Herbarium, Library, Botanic Garden and various R&D Laboratories.

On this occasion, Prof. Asis Datta, Distinguished Scientist and Former Director, National Institute of Plant Genome Research, New Delhi, was the

Chief Guest and he delivered the National Technology Day Lecture on “Dream to Bring Science to Society”.

In his lecture, Prof. Datta discussed creative and innovative ideas for new technologies. He said that there can be no economic advancement without the creation of knowledge. He said that science is a journey not a destination and the road to success is always under construction. Science and technology add value to society only if they are part of the “National Innovation System”, he said.

Prof. Datta appreciated the efforts made in transgenic crops technologies for food security of the world. Genetic modification of crops is not some kind of witchcraft; rather, it is the progressive harnessing of the forces of nature for feeding the human race. Genetic engineering of plants at the molecular level is just another step in humankind’s deepening scientific journey into living genomes, he further added. While discussing about food security, Prof. Datta mentioned that for combating the

threat of world poverty and hunger, the requirement for genetically modified crops needs to be assessed. The safety and testing issues of GM crops need to be taken on a case-by-case basis. Guidelines for regulators as well as that for analysts on safety assessment and testing need to be developed.

Earlier, Dr. C.S. Nautiyal, Director, CSIR-NBRI welcomed the august gathering and introduced Prof. Datta. In the end, Dr. D.K. Upreti, Chief Scientist proposed the vote of thanks.



Prof. Asis Datta delivering the National Technology Day Lecture



CSIR-National Chemical Laboratory (NCL), Pune

CSIR-National Chemical Laboratory (CSIR-NCL), Pune celebrated the 'National Technology Day' on 11th May 2016. On the occasion, Dr. M.K. Gurjar, Chief Scientific Officer, Emcure

products opened possibilities in drug research. He explained the identification of the structures in total synthesis, applications of the new methods and the societal impacts and the benefits of total synthesis.



Prof. Ashwini Kumar Nangia, Director, CSIR-NCL welcoming Dr. M.K. Gurjar



Dr. M.K. Gurjar delivering the National Technology Day Lecture

Pharmaceuticals Ltd., Pune delivered the National Technology Day Lecture.

Dr. M.K. Gurjar spoke on "Transition from Basic Research to Technology Revolution in Drug Industry". He started his talk with total synthesis of natural products and challenges and complications associated with it and how synthesis of natural

Dr. Gurjar explained how science can be converted into the various technologies. He narrated his own experience in which a family of a patient affected by HIV-AIDS approached him for the supply of AZT drug. Although he could not oblige them, he decided to do something so that such patients could benefit from his efforts in future easily. Focusing on total synthesis and technology transfers he touched upon the syntheses of Family Planning Pills, Eribulin which is an anticancer drug, Polymeric Heparin, Irinotecan, Camptothecin and many more.

Dr. Gurjar essentially talked about the reduction of the cost of the drugs to explain how the conversion and packaging costs (CCPC) are important from the industrial point of view. He also presented some of the case studies including the discovery of a new cheaper route for the synthesis of β -Thymidine which is utilized to synthesize AZT, an anti-HIV drug. He discussed about the Chiral Switches explaining the development of single enantiomers. He also recollected the contributions of CSIR-NCL to the synthesis of Chiral drugs. Dr. Gurjar talked about the resolution processes reported for the synthesis of several products such as S-amlodipine, S-metoprolol, S-atenolol, dexrabeprazole sodium, S-etodolac, R-sibutramine, R-ondansetron HCL, etc.

Dr. Gurjar threw light on Green Chemistry that designs products and



processes to use or generate less hazardous chemicals which in turn reduce the pollution. He discussed twelve principles of Green Chemistry and a couple of case studies to underline its societal impact. He expressed that chemists and researchers must have to think at the laboratory about the utility of the kinds of solvents used in the labs to overcome the environmental issues. He said that a number of solvents can even be used for environmental benefits. His talk gave an important message that 'Good Science will lead to Good Technology'.

Earlier, Dr. Girish Sahni, DG-CSIR addressed the CSIR staff through Video Call and stressed on the importance of working towards societal issues.

Prof. Ashwini Kumar Nangia,

Director, CSIR-NCL welcomed Dr. M.K. Gurjar and introduced him to the audience. Reiterating CSIR-NCL's commitment on the expectations of addressing societal issues, Prof. Nangia appealed to the staff to orient their research in the direction of directing the fruits of research for the benefit of the common people. He also launched a new Science Outreach website titled Outreach Science to Society (OSS).

Prof. Nangia urged everybody to find out that extra thing in themselves that can make the change for the benefit of the society. He talked about a few CSIR-NCL technologies that are about to be deployed on the mass level. Some of the demonstrations were also exhibited on the occasion.

CSIR-North East Institute of Science and Technology (NEIST), Jorhat

CSIR-North East Institute of Science and Technology celebrated the National Technology Day 2016 with a special programme held at the Dr J N Baruah Auditorium. Dr. Ch. Mohan Rao, Former Director, CSIR-Centre for Cellular and Molecular Biology, Hyderabad graced the occasion as chief guest and delivered the National Technology Day Lecture. The programme was presided over by Dr. D. Ramaiah, Director, CSIR-NEIST.

Delivering the National Technology Day Lecture on the topic "Science and Technology for Social Good", Dr Rao gave an account of the changes that led to human civilization from Stone Age to the modern day technology age through science. He illustrated the various contributions that India made for the growth and development of humanity

such as the Vedic classification, number names, process for extraction of zinc from its ore, quadratic equation, discovery of plant cell, among others. He also elaborated about significant contributions of CSIR like indelible ink, indigenous supercomputer, Amul milk food, groundwater exploration for potable water and a host of generic drugs in the healthcare sector. Conveying his message on the day, he encouraged everyone present to take this day as a chance to think and come up with relevant solutions for the problems faced by the people of the country. "We need to have empathy, compassion and foresight to use science for social good," he opined.

Earlier, Dr. D. Ramaiah, Director, CSIR-NEIST delivered the welcome address and introduced the chief guest

to the gathering. Recalling the message by the Director-General, CSIR to all the CSIR scientists through Video Conference earlier during the day, he

urged everyone to take a pledge to collectively work as a team and become a solution provider to the problems and issues of the common man.

CSIR-National Metallurgical Laboratory (NML), Jamshedpur

The CSIR-National Metallurgical Laboratory (NML), Jamshedpur celebrated the 18th National Technology Day on May 11. Praveen Chorghade, Chief, R&D Tata Powers, Mumbai, graced the function as the Chief Guest and delivered the National Technology Day Lecture on the topic “Research Application in Power Plant Technology Innovations – Break Through.”

At NML, the function was attended by more than 250 personnel including members of CSIR-NML S&T groups, researchers and postgraduate students, project staff as well as invited guests from Tata Steel and Tata Power.

In his welcome speech, Dr. K. Muraleedharan, Director, CSIR-NML, highlighted the significance of celebrating National Technology Day and recalled his memories associated with his participation in project Shakti as a DRDO scientist. On this occasion, he

also spelt out CSIR’s forthcoming year-long technical program to be undertaken to celebrate the 75th year of the organization.

Dr. Amitava Mitra, Head, BDM Division, made a presentation on technologies developed and transferred during 2015-16 at CSIR-NML.

Delivering the National Technology Day Lecture, chief guest Dr. Chorghade described parameters like global Competitive Index and Global Innovation Index (GII), a measure of economical health of a common man in the country. He said India’s Global Competitive Index 55 is a satisfactory one; however, global innovation index 81 is alarming and cause of concern. He highlighted the importance of collaboration between research institutions like CSIR-NML (technology provider) and organizations such as Tata Power (technology user) for rapid and sustainable development of the country in general and in the power sector in particular.

He emphasized that today’s laboratory technologies in the field of power generation such as supercritical, ultra supercritical and advanced supercritical technologies need to be translated to the user to enhance the country’s power generation efficiency, which is still around 37 percent.

He also suggested that systemic innovations need to be performed in the



field of renewable energy such as wind tunnels and solar energy. Dr. Praveen Chorghade also highlighted the journey of innovations and breakthrough in Tata Power in the domain of power generation, transmission and distribution.

On this day, an MoU was signed

between CSIR-NML and Tata Power, Mumbai, for collaborative research in the field of power sector. During the function, CSIR-NML Annual Report 2015-2016 was also released by the chief guest. S.R. Hembram, Controller of Administration proposed the vote of thanks.



Visits

Dr. Harsh Vardhan Visits CSIR-NBRI, Lucknow

Dr. Harsh Vardhan, Union Minister for Science & Technology & Earth Sciences, Govt. of India, visited CSIR-National Botanical Research Institute, Lucknow on 20 April 2016.

Addressing the scientists and staff of the Institute, he said scientists should think out-of-box and work towards development on innovation-driven research. He also emphasized the need for optimal utilization of resources provided to the CSIR labs in terms of manpower and R&D infrastructure. Dr. Harsh Vardhan advised that CSIR sister labs should work together in synergy in networking mode by sharing of ideas, coordinated planning and carrying forward the Govt. of India initiatives as outlined by the Hon'ble Prime Minister. He emphasized that all scientists should have a dream and transform lives of the common masses of India by developing plant-based products.

Earlier during the visit, Dr. C.S. Nautiyal, Director, CSIR-NBRI welcomed Dr. Harsh Vardhan, in the presence of senior scientists, entrepreneurs, industrialists, officials from Department of Agriculture, U.P. Govt. and farmers. Dr. Nautiyal gave a brief presentation on the R&D activities,



Dr. Tariq Hussain explaining about NBRI Herbarium to Dr. Harsh Vardhan while visiting NBRI Herbarium

public interactions, and novel products developed by the Institute. He presented a brief account of the National Facilities of the Institute viz., i) National Herbarium and about three lakh holdings in the same, ii) Botanic Garden and its theme gardens and newly created Bonsai House, Jurassic Gallery and newly developed varieties by the Institute. The Director's presentation also included three short-term deliverables (Anacardic Acid, Thebaine Rich Opium Poppy Lines and Low Grain Arsenic Rice Variety) and Mission Mode Projects planned by CSIR-

NBRI for the next few years to come.

In a major event of the day Dr. Harsh Vardhan launched the “CSIR-NBRI Herbarium Online” on the CSIR-NBRI website (www.nbri.res.in), thus making one lakh herbarium collections accessible worldwide. He also released a flyer “CSIR-NBRI Herbarium Online” on the occasion.

The detailed features of the website launched were demonstrated to Dr. Harsh Vardhan which includes mechanism to enter Specimen Label

Data, Taxonomic Upgradation Data, Descriptors, GPS Data, Specimen Images & Video Images, and link to Genomics Data and GIS Maps. The enhanced features of the website were also mentioned and it was informed that digitization of one lakh specimens of higher plants has been completed thus making it a unique database of India in terms of Data Profile.

Dr. S. Kumar further emphasized the significance of database in disseminating knowledge to public, students, researchers in various ways such as fast retrieval of information on the label data and through value additions in the form of upgraded taxonomy, images, video images, geographical distributions and genomic information and GIS maps, which is otherwise not available on herbarium sheets. It was also informed that this has a potential of linking the other 95 Herbaria of India.

Dr. Harsh Vardhan took a keen interest in the new website and applauded the efforts put in by the Bioinformatics Group and advised that there should also be a provision for the availability of the data on uses, information useful to general public (especially students, teachers, researchers, environmentalists, etc.) like distribution, landscaping, geographical occurrences so that it becomes a unique knowledge resource of the country where everybody would like to visit the site.

Dr. Harsh Vardhan appreciated the effort of scaling up of CSIR-NBRI and CSIR-CIMAP joint product BGR-34 while interacting with Shri K.K. Sharma, Managing Director, M/s AIMIL Pharmaceutical, New Delhi. Shri Sharma informed Dr. Harsh Vardhan that there was overwhelming response among Diabetes Type-II patients throughout India.



Dr. Harsh Vardhan keenly listening to a presentation by Dr. S. Kumar explaining the comparison of information on Herbarium sheet and value additions on the website



Shri Anand Prakash explaining the tribal panel to Dr. Harsh Vardhan while visiting CSIR-NBRI Museum



Mr. Moinuddin, a progressive farmer from Barabanki, apprised Dr. Harsh Vardhan about the important contribution of CSIR-NBRI in promoting floriculture technology. To a query of Dr. Harsh Vardhan, he replied that CSIR-NBRI technology has helped to increase his income by several folds.

Shri C.P. Srivastava, Deputy Director, Agriculture Department, Govt. of U.P. during his introduction to Hon'ble Minister informed about the benefits to U.P. on the whole from the technology of bio-inoculants provided by CSIR-NBRI and its use on a mass scale in U.P. over the past 13 years. Dr. Harsh Vardhan advised CSIR-NBRI to establish linkage with the information base of U.P. Govt. by using the faster mode of mobile communications, so as to maximize the reach among the farmers of the state.

Dr. Harsh Vardhan appreciated the technologies and products developed by CSIR-NBRI and specifically directed to take up work on scaling up of "Herbi Chew" on a priority basis as a potentially useful product to replace the tobacco based *gutka* currently available in the market which causes cancer and other

health diseases. He was very happy to learn about the progress of CSIR-NBRI in the "Muktashree" Variety and envisaged earliest release of this low arsenic uptake rice variety to the nation. The new variety has been developed by CSIR-NBRI and Department of Agriculture, West Bengal for the benefit of citizens living in arsenic-affected areas.

Dr. Harsh Vardhan also visited different plant houses of the Botanic Garden and planted a sapling of *RaktChandan*.



Hon'ble Minister planting a sapling of *RaktChandan*

Honours & Awards

Former CSIR-IICT Director Conferred Padma Bhushan

Dr. Venkata Rama Rao Alla, Former Director, CSIR-Indian Institute of Chemical Technology, Hyderabad has been conferred with the prestigious civilian award Padma Bhushan for the year 2016 in the field of Science and Engineering.

The Council of Scientific and Industrial Research (CSIR) takes pride in the honor bestowed on him.



CSIR-IICT Scientists Corner Glory

Dr. A. Krishnaiah, Principal Scientist, Crop Protection Chemicals Division, CSIR-IICT, Hyderabad, nominated as member of the Expert Committee under Ministry of Chemicals and Fertilizers, Department of Chemicals and Petrochemicals, Govt. of India, New Delhi, for examining the possibility of filling of the gap of feedstock in chemical sector. His expertise in Crop Protection Chemicals would definitely help in meeting the terms of reference as laid down in the order to enhance competitiveness of Indian chemical industry in global market.



Dr. Sunkara V. Manorama,

Senior Principal Scientist, Inorganic and Physical Chemistry Division, CSIR-IICT, Hyderabad, has been awarded the “Prof. Rudolph A. Marcus Award 2016” (Prof. Rudolph A. Marcus received the 1992 Nobel Prize in Chemistry) by the Publishing Division of Cognizure and LOGNOR. She has been selected as a

winner of this award due to her publications viewed in Scopus.

Dr. Manorama has also been selected for the “Senior Editorship” from Cognizure. This Senior Editorship was given to her as she served the editorial board of their journal *Chemical Sensors* in the past.



Dr. C. Ganesh Kumar, Principal Scientist, Medicinal Chemistry & Pharmacology Division, CSIR-IICT, Hyderabad has been elected as Fellow of National Academy of Agricultural Sciences, New Delhi.



Dr. Anthony Addlagatta,

Principal Scientist of Chemical Biology Division, CSIR-IICT, Hyderabad has been awarded the prestigious CDRI Awards 2016 for Excellence in Drug Research in Life Sciences category for his work on “Medicinal chemistry and

unravelling the structure function relationship of important proteins associated with the ribosomes at the exit tunnel”. This award will be presented to Dr. Anthony on 26 September 2016 at CDRI, Lucknow.



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