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In The News

Prime Minister of India Gives Message to the CSIR Community to Seek Excellence



ON May this year, Shri Narendra Modi took over as the Prime Minister of the country. And as per convention, he also became the President of the Council of Scientific and Industrial Research (CSIR), New Delhi – one of the largest chains of R&D laboratories anywhere in the world.

The Council of Scientific and Industrial Research is a well-knit and action-oriented network of 38 laboratories spread throughout the country with

activities ranging from molecular biology to mining, medicinal plants to mechanical engineering, mathematical modelling to metrology, chemicals to coal, aerospace to oceanography, genomics to drug design, and so on.

Established on 26 September 1942, over the past 72 years of its existence, initiatives and interventions of the scientists of CSIR have galvanized various sectors ranging from agriculture and pharmaceuticals to oceanography and aerospace and even roads, buildings and the environment. Whether it is the first complete genome sequencing of an Indian or development of the first indigenous two-seater trainer aircraft, or for that matter, pioneering the DNA Fingerprinting technology in the country and reducing drudgery in the kitchen by ushering in convenience foods, CSIR has always been at the helm of Indian science.

As President of the Council of Scientific and Industrial Research, Prime Minister Shri Narendra Modi, in his exclusive message through the *CSIR News*, urges the CSIR community to further strive for excellence while at the same time looking for solutions to the challenges facing the country.

Prime Minister's Message on the next page



सत्यमेव जयते

प्रधान मंत्री

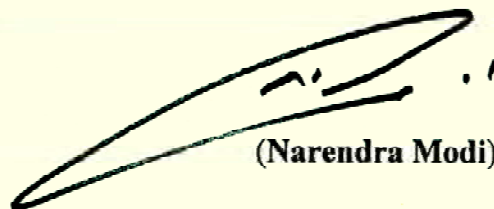
Prime Minister

MESSAGE

I extend my heartiest greetings to the fraternity of the Council of Scientific and Industrial Research (CSIR).

Science and industry must continue to be the locomotive of India's growth, marching in step with the wider priorities of the nation. CSIR has a unique and critical mandate to transplant scientific knowledge from laboratories into the workplace, and to bridge the gap between intellectual pursuit of science and the practical needs of the industry and society at large. In this, the CSIR community needs to apply itself to the day-to-day challenges facing our country, whether in livelihood issues like drinking water and sanitation, nutrition, low cost housing and medicines or in macroeconomic challenges like clean energy, food security, and environmental protection. We need to look for innovative and cost-effective solutions to these problems that still plague our country, by keeping abreast of global trends and developments, while also remaining aware of the rich heritage of Indian society.

I would urge my colleagues in the CSIR to seek excellence, individually and as an organization, in a methodical and time bound manner, so as to help us attain the goals that we have set for the development of our country.



(Narendra Modi)

New Delhi
22 July, 2014

CSIR-NIO's New Research Vessel Dedicated to the Nation



Research Vessel *Sindhu Sadhana*, recently acquired by the CSIR-National Institute of Oceanography (NIO), Goa was dedicated to the nation at a ceremony held at the Mormugao Harbour on 12 July 2014.

Calling it a proud moment, Dr. Jitendra Singh, Vice President-CSIR and Minister of State (Independent Charge) for Science and Technology and Earth Sciences said, “This vessel will enable gathering new information about oceans and its resources. It will also help us to become self sufficient in the emerging world with respect to other countries.”

The Minister dedicated *Sindhu Sadhana* to the nation in the presence of Dr. P.S. Ahuja, Director General, CSIR and Dr. S.W.A. Naqvi, Director, CSIR-NIO.

Dr. Ahuja informed that the principal sectors of research for which the vessel will be used are food, energy, minerals, climate, and environment.

Briefing the gathering about the need for such a ship, Dr. Naqvi said that the oceans are the last frontiers for humans and that we know a lot more about outer space than about the oceans. This is in

large part due to the fact that most of the countries in this region do not have the infrastructure, especially a research ship such as this one, to carry out oceanographic observations. He emphasised that the commissioning of this vessel will go a long way in meeting the basic need for an all-weather sampling platform for studying the role of the ocean in controlling our climate, both present and past, as well as the impacts of human-induced changes on marine biogeochemistry and ecosystems and their feedback to climate change.



The first indigenously built multi-disciplinary research vessel is 80 m long and 17.6 m wide and can accommodate 57 personnel including 29 scientists and 28 crew members. She is designed for a cruising speed of 13.5 knots and an endurance of 45 days. The research vessel has 10 laboratories that are fitted with state-of-the-art equipment facilitating high precision data and sample acquisition.

The ship is equipped with a number of laboratories for online data collection and data processing like single beam and multi beam echo sounders, water column and sub-bottom profiler, gravimeter, magnetometer, Acoustic Doppler Current Profiler, conductivity-temperature-depth profiler, autonomous weather station, air quality monitors as well as sampling gears such as A-frame, Gamma-frame, CTD and deep sea winches with supporting cranes.

The vessel is also equipped with dynamic positioning system that allows holding the

vessel at a point for sampling including 24-m long sediment cores. It also facilitates precise deployment of instrumented moorings, towing of Remotely Operated Vehicles (ROVs) and Autonomous Underwater Vehicles (AUVs).

The CSIR-NIO is planning to carry out several observational campaigns onboard RV *Sindhu Sadhana*, which will improve the present understanding of the process in the seas around India and provide additional inputs for forecasting the variations in marine environment. The seafloor information resulting from high resolution mapping and sampling will help in identifying suitable areas for offshore developments and mineral prospecting including petroleum hydrocarbons.

Also planned are studies to understand the importance of sedimentary processes in the burial of organic matter and sequestering of atmospheric carbon dioxide in marine sediments which play a significant role in global carbon budget.



Glimpses of the function dedicating *Sindhu Sadhana* to the nation

“DHVANI” – Indigenous Advanced Target Training System developed for Indian Army by CSIR-NAL



The Experimental Aerodynamics Division at the CSIR-National Aerospace Laboratories (NAL), Bangalore along with the Indian Army's Simulator Development Division, Secunderabad has developed a state-of-the-art target training system named 'DHVANI' for perfecting marksmanship skills by accurately determining the location of bullet impact and providing real-time feedback to the shooter.

'DHVANI' (Detection and Hit Visualization using Acoustic 'N'-wave Identification) is based on the basic principles of gas dynamics and aeroacoustics and costs just 40% of the cost of an imported system.

In modern warfare, there is an immediate need not only to equip the Indian soldier with the latest weaponry but also to revolutionize the techniques to train him for efficient battlefield operation. Among the most basic skills of a soldier is marksmanship. Marksmanship training requires positive and negative reinforcement of shooting techniques immediately after each shot is fired. It is not only essential to provide the marksman with an indication of where a bullet is fired at a target, but also provide a comprehensive statistics of how he/she has performed throughout his/her career as a marksman.

Currently, the manual system used by the Indian Army involves the marksman firing shots at the target and subsequently walking up to the target (about 300 m!) and identifying whether the shots were a hit or a miss. This primitive type of marksmanship training exhibits not only high turnaround times but is also inconsistent, unreliable, inaccurate and subjective.

Marksmanship training systems available from advanced countries for sale are mostly based on 1980s technology. Further, they are exorbitantly expensive since they are not customized for the Indian environment and necessitate expensive after-sales service due to the black-box approach of the manufacturers.

The need was to develop a modern indigenous system tailor-made to meet the requirements of the Indian Army at a cost lower than similar systems available elsewhere without compromising the performance. And DHVANI fits the bill admirably.

Essentially, a bullet is a supersonic projectile which generates a shock wave from its leading edge, continuously at every point of its supersonic travel. At any instant along the bullet path, the shock wave envelope propagates in an invisible-cone continuously outward at an angle related to its Mach number.

The pressure wave in air caused due to the passing of the bullet results in a pressure profile known as the '*N*-wave' because of its shape. If the rise in pressure and the associated frequencies fall within the range of audibility of human ear, the N-wave can be heard as a distinct sound. This sound is akin to the 'Sonic Boom' – the sound perceived on the ground when an aircraft flying overhead exceeds the speed of sound.

It is possible to determine the hit location of the bullet accurately by using an array of sensors to record the acoustic pressure rise due to the passing shock from the bullet and hence to detect the path of the incoming bullet.

Using advanced algorithms developed at CSIR-NAL, the recorded signal from the



sensors are analysed for the detection of the N-wave and the geometrical shape of the shock wave is used to determine the co-ordinates of the bullet on the target. These co-ordinates are then wirelessly transmitted to a display at the shooter end. The whole process – firing a shot to displaying at the shooter end – takes less than half a millisecond. At the shooter end, a multi-functional interactive GUI on a MIL grade laptop displays the results. A comprehensive database containing personnel details, shots fired and performance statistics ensures comprehensive logging for later analysis.

The entire process from the Indian Army's request to the prototype testing took only 10 months, and a shoestring budget of Rs 40 lakh for two units, demonstrating that

all military related R&D need not have protracted delays and costs. Each prototype currently costs Rs 9 lakhs/firer lane, which is significantly lesser than the Rs 15-18 lakhs for each firer lane of older generation wired systems offered to the Indian Army. When the lifecycle costs are added, this indigenous system works out to only about 40% of the cost of an imported one. Considering that there are over 2000 firing lanes all over the country, the saving to the national exchequer is significant.

The system has undergone rigorous field trials at Army ranges in Bangalore, Secunderabad and Infantry School Mhow. The formal handing over of DHVANI by Director CSIR-NAL to Commandant SDD Secunderabad took place on 3 July 2014.

CSIR-IITR awarded Certificate of GLP Compliance

CSIR-Indian Institute of Toxicology Research (CSIR-IITR), Lucknow has received the GLP Compliance Certification from the National GLP Compliance Monitoring Authority (NGCMA), Government of India. The certificate is issued with respect to toxicity and mutagenicity studies.

GLP is an internationally accepted quality system concerned with the organizational process and the conditions under which pre-clinical health and environmental safety studies are planned, performed, monitored, recorded, archived and reported. The national and international regulatory authorities/agencies require the safety data of all new products including industrial chemicals, pharmaceuticals, veterinary drugs, pesticides, cosmetic

products, food products and feed additives, etc., prior to their launch into the market. GLP is a system that has been evolved by the Organisation for Economic Co-operation and Development (OECD) and is used for achieving such safety goals.

It is also noteworthy that CSIR-IITR is the first CSIR Laboratory which has received this international accreditation. The GLP certification is a testament to high quality research by way of thorough SOP-driven Good Laboratory Practices, competent well-trained personnel and systematic documentation at CSIR-IITR. The certificate states that specified studies in the areas of toxicity and mutagenicity conducted at CSIR-IITR comply with OECD principles for GLP. The GLP Laboratories at CSIR-IITR are designed as per OECD guidelines, which make the integrity and quality of the Laboratory data adequate for regulatory submissions across the globe.

India has a full adherence member status of OECD's Working Group on GLP, so the toxicity/biosafety data generated for chemicals/formulations from GLP certified facility of CSIR-IITR will be accepted as such by the regulatory authorities in all the thirty four OECD member countries and all other associated non-member countries



Former President of South Africa Appreciates India's Message of Scientific Temper

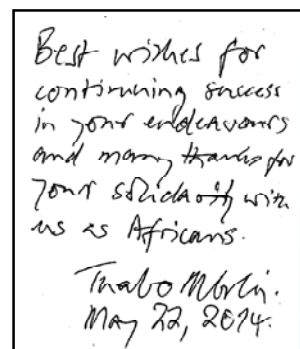


At the 4th Annual African Unity for Renaissance Conference held from 22–24 May 2014 in Tshwane, South Africa, the former President of South Africa, Thabo Mbeki addressed the inaugural session.

After the inauguration, it was a proud moment when during informal discussions on scientific temper with Mr Gauhar Raza, Chief Scientist, CSIR-National Institute of Science Communication and Information Resources (NISCAIR), New Delhi, the former President of South Africa while talking about India's dream of creating a scientifically tempered society and appreciating its solidarity with the African Nations, scribbled the following message on a copy of the *Journal of Scientific Temper*.

*"Best wishes for continuing success in your endeavours
and many thanks for your solidarity with us as Africans.
Thabo Mbeki May 22, 2014"*

The *Journal of Scientific Temper* is a quarterly journal published by CSIR-NISCAIR. Mr Gauhar Raza is the Editor of the journal.



CSIR-NEERI gets Technical Excellence Award

CSIR-National Environmental Engineering Research Institute (NEERI), Nagpur in association with Nandesari Industries Association (NIA, Gujarat) has developed an 'Electro Oxidation Technology', which was recently implemented by NIA for the treatment of chemical industry wastewater. Such a CETP scale electro oxidation technology has been implemented for the first time in India.

The Nandesari Industries Association recognized this significant achievement of CSIR-NEERI towards sustainable development of the nation by presenting a 'Technical Excellence Award' and a 'Certificate of Appreciation' to the Institute.

An electro oxidation plant comprising



Dr. N.N. Rao receiving Technical Excellence Award and Certificate of Appreciation at the hands of Shri Babubhai C. Patel and others at NIA, Nandesari, Gujarat

26 reactors has been installed at NIA for treatment of 50 lakh liters of highly polluted chemical industry effluents every day. This plant was recently inaugurated at the hands of Shri K.U. Mistry, Chairman, Gujarat Pollution Control Board. Dr. N.N. Rao, Senior Principal Scientist, CSIR-NEERI, who is the inventor of this technology, was also present on the occasion.

The 'Electro Oxidation Technology' developed by CSIR-NEERI is based on the principle of electrochemistry. Exploitation of this branch of chemistry for industrial

effluent treatment is relatively new. CSIR-NEERI began research in this area during the latter half of the nineties and more intensive research has been carried out since then for over a decade.

CSIR-NEERI has been providing consultancy services to Nandesari Industries Association, Nandesari, Vadodara for upgradation of their common effluent treatment plant (CETP). The CETP caters to the treatment of high strength chemical industry wastewater. Based on extensive laboratory and field studies on this unique type of wastewater, CSIR-NEERI recommended 'Electro Oxidation Treatment' to bring down the organic pollution load.

In association with Nandesari Industries Association, CSIR-NEERI conducted several pilot-scale studies for over five years culminating into the development of the 'Electro Oxidation Technology'. The major advantage of this technology is its environmental compatibility, operation at room temperature and atmospheric pressure, and amenability to automation. No solid residues are formed. It can offer complementary treatment as well as complete treatment. Partially treated effluents display enhanced biodegradation.

Dr. N.N. Rao, Senior Principal Scientist, Wastewater Technology Division, CSIR-NEERI, and the inventor of the technology, received the award and certificate at the hands of Shri Babubhai C. Patel (Chairman and President, NIA), Shri Prakashbhai Vakharia (Vice president, NIA) and Shri. A. Amin (Hon. Secretary, NIA).

Dr. Rao gave credit to Team CSIR-NEERI and Team WWT for this grand success. He is looking forward to integrating electrochemical treatment approaches with conventional treatment technologies to enable industries to comply with regulatory standards for discharge of treated effluents.



Dr. N.N. Rao during inauguration of the Electro Oxidation Plant at NIA, Nandesari, Gujarat



Electro oxidation plant at NIA, Nandesari, Gujarat

R&D Highlights

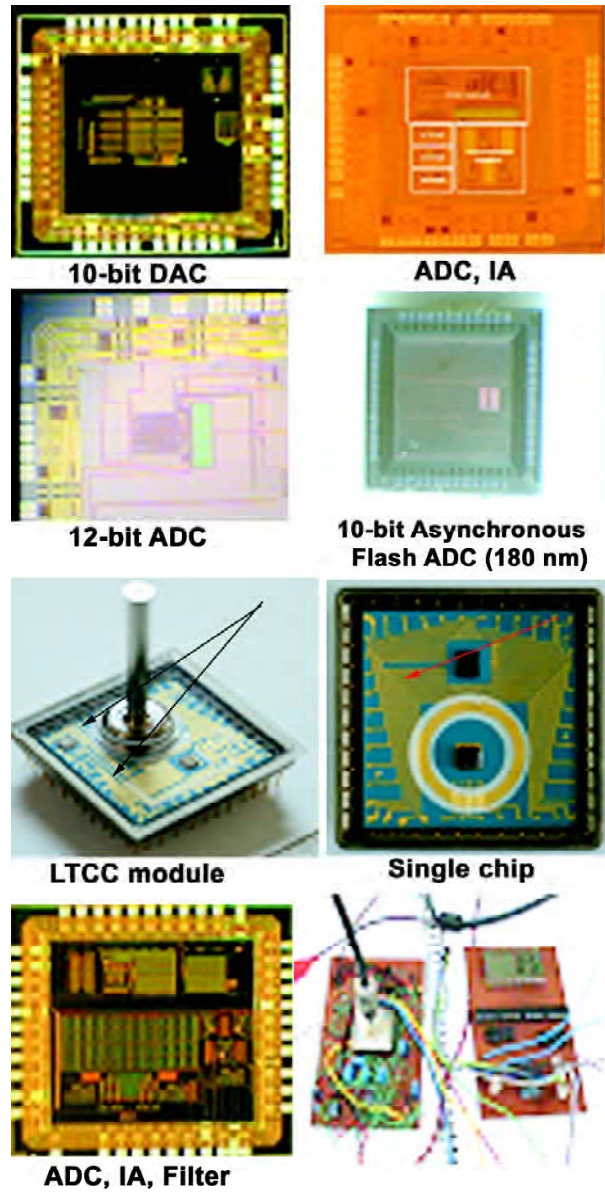
Mixed Signal Circuits developed by CSIR-CEERI

A fully integrated sensor read-out system with low-power consumption and occupying small area is necessary for strategic and other applications. In these systems, the primary requirement is to integrate the sensor and the signal conditioning circuit on a single substrate or in a single package. In the single package approach, the sensor and one or more dies of CMOS circuit are placed in a single package using different packaging techniques. A sensor read-out circuit typically comprises of sensor interface/conditioning circuit and signal processing block.

Under sponsored projects from DeitY/MCIT, CSIR-CEERI is engaged in design and characterisation of various mixed signal/analog building blocks for designing such monolithic read-out circuits – including 10-bit current steering DAC, 10-bit SAR-based ADC, Instrumentation Amplifier, 2nd Order Filter, 12-bit SAR-based ADC and 10-bit Pipelined ADC fabricated in 0.35 μm AMS technology. The measured values of some of the fabricated designs are given in Table 1.

A prototype of pressure sensor read-out system with these chips was then designed that uses an in-house fabricated pressure sensor placed in a single package utilising in-house developed LTCC technique. The pressure sensor read-out system was tested up to 5 bar of pressure. A novel technique has also been developed for compensation of temperature effect on pressure sensor. This circuit uses 10-bit DACs designed and fabricated under the project.

Similar chips are also planned for development of read-out circuits for other MEMS-based sensors like accelerometer, gyroscope, etc. in the future.



Mixed signal circuits

Table 1: Test Results of Fabricated Chips

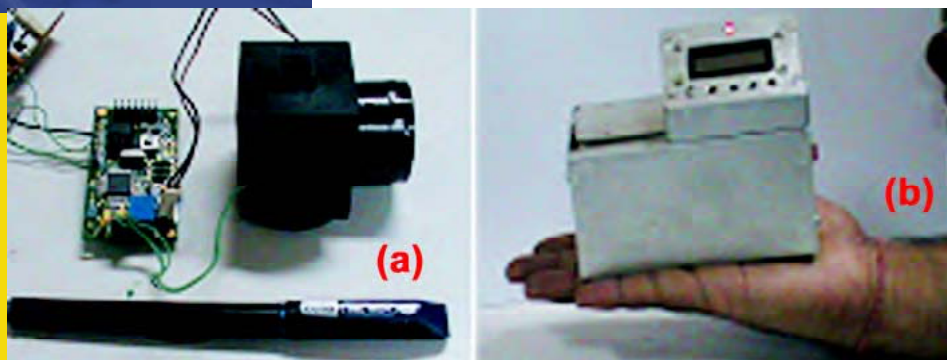
Chips (in LSB)	DNL (in LSB)	INL	SFDR@1KH z inut	SNR@1K Hz input
10-bit DAC	0.33/-0.39	0.70/- 0.97	41.2 dB	47.5 dB
10-bit ADC	0.45/-1	1.75/-1.49	59.7 dB	54.3 dB
12-bit ADC	-3.88/-1	4.80/-1.48	66.09 dB	60.39 dB

Portable Arsenic Detector developed by CSIR-CEERI

CSIR-CEERI has developed a battery-operated portable system to detect Arsenic (at ppb level) in water. This was achieved as an inter-institutional project (between

CSIR-CEERI and BITS-Pilani, Pilani Campus) under a DST sponsored project. When illuminated by 480nm light, the biosensor developed by biology group of BITS-Pilani generates green fluorescence. The intensity of the green fluorescence depends upon the concentration of arsenic in the water sample.

The system detects the fluorescence, processes it and then displays the result on LCD screen. The detector is shown in the figure .



Portable Arsenic Detector (a) Arsenic detection board
(b) Complete system

CSIR-CEERI develops X-ray Imaging-based Mango Sorting System

CSIR-Central Electronics Engineering Research Institute (CEERI), Chennai Centre has developed an X-ray imaging based mango sorting system to sort mangoes based on internal disorders (spongy tissue & seed weevil) in real time.

The system, developed with funding support from the Department of Science and

Technology (DST), was configured around an X-ray baggage inspection system procured from M/s Electronics Corporation of India Ltd. (ECIL), Hyderabad. The system can detect the seed weevil in mango varieties like alphonso, neelam and totapuri and spongy tissue in alphonso mangoes. It can detect two fruits every second.

The X-ray scanned mangoes are safe for consumption and there is no health hazard. The developed system was successfully demonstrated to various user agencies, equipment manufacturers and potential entrepreneurs for over two seasons. CSIR-CEERI is keen to find imaging solutions for other fruit related problems like fruit fly, etc.



X-ray Imaging-based Mango Sorting System

For further details, contact:

Scientist-in-charge, CSIR-CEERI Centre, CSIR Madras Complex, CSIR Road, Taramani, Chennai-600 113

Ph.: 91-44-2254 2281; Fax: 91-44-2254 1889;

Email: sicceeri@csircmc.res.in.

CSIR-CSMCRI Launches Indigenous Technology for Agarose



The CSIR-Central Salt and Marine Chemicals Research Institute (CSIR-CSMCRI), Bhavnagar has developed technology for the preparation of world class agarose (Trademark SAgarose).

Scientists at the CSIR-CSMCRI have developed cultivation technology for *Gracilaria dura* to generate abundant biomass for SAgarose production. The new technology is simple, energy-efficient and eco-friendly and produces superior quality SAgarose.

The SAgarose product exhibits excellent properties [sulphate content: 0.2% *w/w*; degree of electro-endosmosis: 0.13; gel strength: 2200 g cm²; and gelling temperature: 35°C; free from DNase, RNase activity] essential for demanding molecular biology applications, and the desired gel

electrophoretic separation of DNA and RNA was demonstrated.

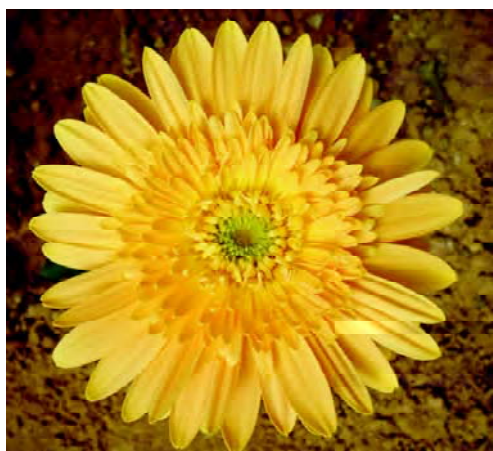
The agarose-depleted extract, along with water used for washings, was subjected to reverse osmosis for recovering the surfactant in concentrated form for its subsequent reuse. The energy savings was ca. 376.8 MJ kg⁻¹ of agarose. Other important advantages of the new technology are (i) shorter process time, (ii) lower capital expenditure, and (iii) use of cultivated *Gracilaria dura* for the SAgarose production.

SAgarose has been evaluated extensively at different internationally known biology laboratories in India and found to be suitable for molecular biology applications. CSIR-CSMCRI recently licensed the technology to M/s AquaGri Processing Pvt. Ltd, New Delhi for commercial production.

Technology Release

CSIR-IHBT Releases Novel Cultivars of *Gerbera jamesonii*

The CSIR-Institute of Himalayan Bioresource Technology, Palampur has developed and released new cultivars of *Gerbera jamesonii* viz. Him Glow



Him Glow



Performance evaluation of Him Glow under polyhouse condition

Salient Features of Him Glow

Stem length (cm)	41.2
Flower head type	Double
Flower diameter (cm)	10.8
No. of flowers per plant in a year	23.5
No. of flowers per square meter in a year	210
Colour of leaves	Dark green
Outer colour of petals	Yellow orange*
Inner colour of petals	Yellow orange*
Disc colour	Green
Flower vase life (days)	18
Diameter of Inner ray florets (cm)	6.7
Flower type	Standard

*Colour Chart of The Royal Horticulture Society, UK

(CSIR-IHBT-Gr-23-1) and Him Peace (CSIR-IHBT-Gr-E-3). These have been developed through hybridization and selection approach.

The cultivars were selected based on flower shapes, bright colours and long-vase life. The cultivars have been developed through controlled hybridization programme using characterized gerbera lines as parents and selecting the promising hybrid genotypes based on floral attributes and field performance. The cultivars have illustrated promising nursery performance and show vigorous growth and adaptability under greenhouse conditions.



Him Peace



Performance evaluation of Him Peace under polyhouse condition

Salient Features of Him Peace

Stem length (cm)	33.1
Flower head type	Double
Flower diameter (cm)	7.9
No. of flowers per plant in a year	18.8
No. of flowers per square meter in a year	170
Colour of leaves	Dark green
Outer colour of petals	White*
Inner colour of petals	White*
Disc colour	Green
Flower vase life (days)	15
Diameter of Inner ray florets (cm)	5.6
Flower type	Mini Dwarf

*Colour Chart of The Royal Horticulture Society, UK

Workshops

CSIR-CIMAP Workshop on Essential Oil Processing Technologies



The Central Institute of Medicinal and Aromatic Plants (CSIR-CIMAP), Lucknow organized a six-day hands-on training workshop *Entrepreneurial Training on Essential Oil Processing Technologies* (EOPT-2014) during 26-31 May 2014. Seventeen participants from Karnataka, Tamilnadu, Andhra Pradesh, Maharashtra, Gujarat, Haryana, Punjab and UP took part in the training.

The workshop was specially designed to impart systematic knowledge on the processing technologies for aromatic plants and to familiarize the participants with the technical and practical aspects of the techniques, methodologies and machineries being used in the field of distillation and value-addition to essential oils. Special emphasis was laid on quality analysis procedures for essential oils as the export market demands only high quality products.

The training workshop coordinated by Er. Sudeep Tandon, Principal Scientist & Head, Process Chemistry & Technology Department of the Institute, was divided into nine themes covering constructional and design features of plants & machineries, distillation techniques and methods suited to different classes of aromatic herbs at pilot and commercial scale, post-harvest handling and processing for better recovery/quality of essential oils, fractional distillation of essential oils for isolation of aroma chemicals, production of concretes and absolutes from flowers and process technology for crystallization of menthol flakes and quality control.

All the experiments were supported by theoretical lectures relating to post-harvest processing, importance



Participants having hands-on exposure on rose distillation

of good agricultural and harvesting practices, approaches for value addition of essential oils and aroma chemicals for industrial utilization in flavor and fragrance commodities and marketing of essential oils. Prof. A.K. Tripathi, Director, CSIR-CIMAP exhorted the participants to establish essential oil processing units in the areas where such crops are grown to facilitate the value addition and job creation in the rural sector.



Participants of the EOPT-2014 with CSIR-CIMAP scientists and Director Prof. Anil Kumar Tripathi (seated fifth from left)

Events

CSIR-IICB Celebrates its 58th Foundation Day

The CSIR-Indian Institute of Chemical Biology (IICB), Kolkata celebrated its 58th Foundation Day on 2 April 2014 at the Dr. J.C. Ray Memorial Auditorium. Dr. Suranjan Das, Vice-Chancellor of University of Calcutta was the Guest-in-Chief. Dr. Mammen Chandy, Director, Tata Medical Centre, Kolkata delivered the 26th Dr. J.C. Ray Memorial Lecture.

Dr. Chitra Mandal, Outstanding Scientist, CSIR-IICB, welcomed the audience for the 58th CSIR-IICB Foundation Day Celebration. She mentioned that the focus of research activities of CSIR-IICB is directed mainly towards diseases of national importance and biological problems of global interest blending between Chemistry and Biology that translate into a commitment to provide affordable healthcare for all through modern science. She emphasized that a steady progress in the number of quality publications in journals with high impact factors is the hallmark of the Institute's

advancement in research.

In the introductory lecture, Dr. Arun Bandyopadhyay, Chairman of the Foundation Day Committee, talked about the history of the Institute's glorious past. The Guest-in-Chief, Dr. Suranjan Das, in his inaugural address talked about the symbiosis between Science Policy and Science Communication. He urged the CSIR-IICB scientists to come forward to inculcate scientific temper among the people of India. He also stressed on more co-operation between the Institute and University.

Dr. Mammen Chandy delivered the XXVI J.C. Ray Memorial Oration lecture entitled *Are We In The Era Of Genomic Medicine?* In his fascinating lecture he informed how scientific research on gene analysis is directly helpful in the treatment of cancer patients. He wanted scientists to search for driver mutation, understanding the various signaling pathways in order to develop better improved Cancer Chemotherapy.



Glimpses of the Foundation Day

CSIR-IICB observes International Immunology Day



The International Immunology Day (DoI) was celebrated on 29 April 2014 at CSIR-IICB, Kolkata. Welcoming all the participants, Prof. Siddhartha Roy, Director, CSIR-IICB, explained the need for celebrating such events and the relevance of immunological research. In the Introductory Address Dr. Chitra Mandal, Outstanding Scientist, CSIR-IICB discussed the genesis of the DoI. She dedicated the day to the Late Prof. B.K. Bachhawat, former Director, CSIR-IICB.

The focus of DoI 2014 was on vaccination. Misconceptions about the safety of vaccines are arguably increasing. DoI offers an ideal opportunity to reach out to the public-at-large, particularly parents, in order to discuss and dismiss concerns. In this regard, Dr. Mandal shared her experience in the Polio Vaccine programme in which she is deeply involved. She informed that now India has been declared a polio-free country.

Dr. Malini Sen, Senior Scientist, CSIR-IICB delivered a lecture on *Immune System Networking: Meeting Challenges*. She said that the human immune system is a well orchestrated system embracing panoply of specialized cells groomed to protect us from environmental insults. Dr. Sen informed that human immune cells are presented with sensors for detecting harmful agents, thus always being present for rousing appropriate immune responses. Steady state signalling mediated by specific ligand – receptor interactions (for example Wnt-Frizzled interaction) at both autocrine and paracrine



Prof. Siddhartha Roy delivering the welcome address

levels – account at least partly for such immune homeostasis. Commensal bacteria that reside in our system also contribute to the sustenance of immune homeostasis through controlled signalling cascades.



Dr. Malini Sen delivering her lecture

She added that some of the challenges faced by our immune system are uncontrolled inflammation, autoimmunity and persistent infection by specific pathogens.

Dr. Dipyaman Ganguly, Senior Scientist, CSIR-IICB presented another popular lecture on *Me or not me?: The philosophical countercurrents in sensing the self*. Dr. Ganguly said that the biological definition of ‘me’-ness or individuality finds the immune system as a key determinant since both in physiological and philosophical contexts the immune system provides a principle of exclusion whereby one can define what is



Dr. Chitra Mandal delivering the introductory lecture

‘self’ and what is ‘nonself’. He added that in the philosophical context the dominant idea has been that the immune system is instrumental in the advent of multicellular life. As with the advent of multicellularity there is conflict of Darwinian individuality among the individual cells, an intra-organismal surveillance system has to exist to get rid of individual cells that refuse



Dr. Dipyaman Ganguly delivering his lecture

to relinquish their claim to Darwinian fitness.

The immune system has been shown to be capable of providing such a surveillance system, he said, as evident from experimental data from *Dictyostelium* (Adam Kuspa, 2007) and cancer immunosurveillance in mammals (Robert Schreiber, 1999). Extension of this idea to every level of biological individuality also gains approval as immune mechanisms are described in a single cell (CrispR system) as well as supra-organismal social insects (James Traniello, 2002). Thus the existing experimental data and conceptual thoughts point to a key role of the immune mechanisms as the determinant of biological individuality.

Some students also delivered lectures during the programme. About 100 students and faculties were present. To encourage the students and to make the event more competitive student speakers were awarded.

CSIR-NEERI celebrates National Science Day

The CSIR-National Environmental Engineering Research Institute (CSIR-NEERI) celebrated the National Science Day on 28 February 2014 in the NEERI Auditorium. Dr. Satish R. Shetye, Vice-Chancellor, Goa University & Former Director, CSIR-National Institute of Oceanography (CSIR-NIO) was the Chief Guest on this occasion.

While delivering the National Science Day Lecture on *Physics of Monsoonal Estuaries of the West Coast of India*, Dr. Shetye said that India has a coastline of more than 7000 km and estuaries more than 100. He mentioned that the freshwater brought by the rivers mixes with seawater in the estuary and tides force the seawater in and out of the estuary thus influencing the mixing. He pointed out that the monsoon plays an important role in maintaining the ecosystem of these estuaries. High run-off during the monsoon (June to September) and the remaining eight months of long dry season with little run off lead to striking temporal changes in salinity and velocity fields in these estuaries, he added.

Dr. Shetye stated that the ecosystems and natural habitats that are associated with the estuaries naturally adjust to the seasonality, but in recent times as anthropogenic impacts are increasing the estuaries are under serious threat. It is therefore necessary to model the hydrology of the catchment area to quantify the runoff (sewage, industrial effluents, etc.) that enters



Dr. S.R. Shetye delivering the National Science Day Lecture; Seated on the dais (from left) Dr. S.R. Wate and Prakash Kumbhare

the estuary, he advocated. Specifically speaking about the Mandovi estuary in Goa, Dr. Shetye informed that his research team succeeded in developing a model to study physical processes of the Mandovi estuary. The model is capable of reproducing the observed tides and annual cycle of salinity field in the estuary, he added. He mentioned that the model also allowed estimation of residual circulation with more saline water

entering the estuary near the bottom and fresher water leaving the estuary near the surface.

Earlier, in his welcome address, Dr. Satish R. Wate, Director, CSIR-NEERI narrated the importance of National Science Day. Science should be practiced in such a way that it should be translated into technology having application to society, he said.



CSIR-IHBT celebrates National Technology Day

The CSIR-Institute of Himalayan Bioresource Technology (IHBT), Palampur celebrated the National Technology Day on 11 May 2014. Dr. C.R. Bhatia, Former Secretary, Department of Biotechnology, Govt. of India delivered the National Technology Day Lecture on the topic *Development of Technology*.

Dr. Bhatia highlighted the role of Indian science and technology in achieving the success of Green Revolution and said that through continuous technological interventions India could achieve food security for its 128 crore current population which was 34 crore at the time of independence. However, he also enumerated the ill effects of modern agriculture viz., land degradation, ground water depletion, nitrate and pesticide accumulation in the water bodies and other environmental problems, loss of traditional varieties and biodiversity. Therefore, he emphasized that while implementing any technological intervention, a holistic approach should be considered. Dr. Bhatia highlighted the role of modern technology for attaining quality life, security of food, water, livelihood, energy and health and hoped that the youth which accounts for 65% of our population could play a pivotal role for achieving the goal.

The function was presided over by Prof. S.K. Joshi, Former DG, CSIR and Vikram Sarabhai Professor. In his address, Prof. Joshi highlighted the R&D contributions of CSIR in improving the economy and societal benefits.

Dr. P.S. Ahuja, DG, CSIR and Director of the Institute in his welcome note conveyed that for development of modern India as a



Dignitaries on the dais

respectful nation, indigenous technology development is the key. Focusing the attention of young students, he conveyed that innovation could be done by any one of any age, stage and stature. He advised the researchers to solve problems in a simple way using common sense without involving any complexity. He gave a brief account of the significant achievements of the Council and the Institute viz., biomass-based fuel, computer-based modern tools for detection of adulteration in the medicines and SOD enzyme technology which has wide application in health, cosmetics, agriculture and food industry. He informed that many technologies are in the pipeline for transfer viz., stevia technology, diversified value-added tea products, etc.

The function was attended by a large number of dignitaries, such as the Former VC of the HP Agriculture University, Prof. S.K. Sharma, the National Professor, Prof. Anupam Verma, scientists from the regional IVRI station, HP Agriculture University, students from the Navodaya Vidyalaya, Paprola (H.P.), local residents and members from press and media.

National Technology Day Celebration at CSIR-IMMT

The National Technology Day was celebrated at the CSIR-Institute of Minerals and Materials Technology (IMMT), Bhubaneswar with an invited lecture by eminent academician and researcher on atmospheric sciences, Prof. U. C. Mohanty of IIT-Bhubaneswar, who has won national and international acclaim for his work on more accurate prediction of extreme weather events using computer based modeling and simulation tools.

Prof. Mohanty explained in a lucid manner the reason behind occurrence of extreme weather events, and the difficulty in prediction of the apparently chaotic dynamics of weather in the short, medium and long term. He however elucidated how with better models, greater computational power, and more accurate multi-dimensional

parametric inputs, the accuracy of weather prediction has been improving day by day. The benefit of such improvement was clearly demonstrated during the cyclone “Phailin” that struck the Odisha coast. Because the time, location, spread and intensity of the cyclone could be predicted with impeccable accuracy, the damage to life and property could be minimized to a great extent.

The lecture was well attended and Prof. Mohanty answered many searching questions on global warming, El-Nino effect, monsoon dynamics, prediction of cloud burst, etc.

Prof. Mohanty stressed the need for CSIR-IMMT and IIT-Bhubaneswar to work together to develop socially relevant and economically important technologies for improving the lives of people.

CSIR-NEERI celebrates National Technology Day

The National Technology Day was celebrated at CSIR-National Environmental Engineering Research Institute (CSIR-NEERI) on 12 May 2014 in the NEERI Auditorium. Shri Mahesh K. Patil, Vice President, HSEC, Sesa Sterlite Ltd., Goa was the Chief Guest on this occasion.

While delivering the National Technology Day Lecture on *Advancement in*

Science & Technology for Environment Protection in Mineral Industry, Shri Patil said that mining activities in the country can be permitted only if new and effective environmental technologies are in place. While exploiting minerals in the country, it is also necessary to preserve wildlife and bio-diversity, he added. He briefed about the various processes that are taking place in the industry for mining operations.

Shri Patil said that earlier exploration in the mineral industry was done through trial pitting, trenching and tunneling, which was not environment-friendly, but now the industries have introduced more sophisticated exploration techniques such as Reverse Circulation (RC) and Wireline Triple Tube Diamond Core Drilling (WL-TT-DCD). Similarly, advancements in methods of surveying have taken place, he added. Shri Patil stated that LiDAR (Light Detection and Ranging) Survey facilitates the acquisition of data over the Earth’s surface within a fraction of a second.



Shri Patil delivering the Lecture

While briefing about the geophysical methods, he informed that aeromagnetism helps to cover much larger areas of the Earth's surface quickly for regional reconnaissance for mining. New IT (Information Technology) based systems are in place in many parts of the world and in some mines in Goa, through which actual production can be monitored on real time basis, he said. Shri Patil mentioned that in the recent past, major mining companies have introduced Radio Frequency Identification Device (RFID) technology for tracking

transport trucks and to obtain real time transport data.

Earlier, Dr. Satish R. Wate, Director, CSIR-NEERI delivering the welcome address said that the Institute is committed to provide sustainable technologies to industries to further environmental protection. He also briefed about the 12th Five Year Plan projects being taken up by the Institute to provide various technological options for clean water, clean air and waste to energy. He emphasized on the need to develop indigenous low cost technologies for rural areas.



World Environment Day

CSIR-Central Building Research Institute (CBRI), Roorkee

The CSIR-Central Building Research Institute (CBRI), Roorkee celebrated the World Environment Day 2014 on 5 June 2014 to promote awareness about the importance of preserving our biodiversity, the need to identify problems related to the environment and ways to take corrective action.

Shri Jai Raj, IFS, Addl. Principal Chief Conservator of Forest (Environment), Dehradun, Prof. S.K. Bhattacharyya, Director CSIR-CBRI and Prof. Prem Krishna, Chairman, Research Council, CSIR-CBRI, Roorkee planted trees in the CSIR-CBRI Campus as a gesture of harmonious living with nature.

In his speech, Shri Jai Raj emphasised that every human being should contribute a little to protect the environment and in this connection he appreciated the initiatives taken by CSIR-CBRI for taking environmental issues seriously and also proposed that both CBRI and the Forest Department of Uttarakhand can have joint projects on environmental problems of Uttarakhand.

Earlier, Prof. S.K. Bhattacharyya, Director CSIR-CBRI in his Presidential Address apprised that unlike the previous years, different trees were chosen for plantation. Prof. Bhattacharyya mentioned that CSIR-CBRI will continue its activity to develop environment-friendly technologies



Dignitaries on the dais

and pursue research to protect the environment and work for conservation of biodiversity of the region.

Prof. Prem Krishna, Chairman, Research Council while addressing the gathering said that in recent times, the need to promote more earth friendly practices in order to maintain the health of our planet has come to the forefront, as world nations struggle to reverse the present trend of climate change. The World Environment Day is an occasion to show our gratefulness to Mother Nature, which sustains all forms of life. This is the day to focus our thoughts and our energies to make collective efforts towards protecting the environment. This is

an urgent appeal to each one of us to recognize the significance of the “Elixir of Life” and the role each one of us can play to conserve it. India has rich traditional knowledge and wisdom in the conservation

of nature and natural resources. Religious beliefs, culture and folklore have together treated nature and environment with sanctity.

Poster Competition was also organized for CBRI wards and winners were awarded.



Prof. S.K. Bhattacharyya, Director CSIR-CBRI planting trees



Shri. Jai Raj, IFS, Addl. Principal Chief Conservator of Forest (Environment), Dehradun, planting trees

CSIR-National Botanical Research Institute (NBRI), Lucknow

To spread the message of caring for the environment, the CSIR-National Botanical Research Institute (NBRI), Lucknow, celebrated the World Environment Day on 5 June 2014. The theme of this year was ‘Raise your voice, not the sea level’.

A Quiz Competition was organized for 25 students of XII+ (science background) from the National Post Graduate College, Lucknow. The students answered the

questions of the quiz conducted by Dr. Kamla Kulshreshtha, and judged by Dr. S.K. Raj and Dr. J.K. Johri.

Rewarding the students Dr. C.S. Nautiyal appreciated the ‘scientist-student interaction’ on the issue of the environment. An oath was also administered to the students to creating awareness in the society regarding saving the environment.



Dr. C.S. Nautiyal giving prizes to the participants

CSIR-National Chemical Laboratory (NCL), Pune



CSIR-National Chemical Laboratory (CSIR-NCL), Pune has significantly contributed to the greenery of the city with its existence over six decades and transformed a barren land of about 475 acres. CSIR-NCL has a large flora comprising heterogeneous mixture of rare, endangered, ornamental and medicinally important trees, shrubs and herbs.

CSIR-NCL organized a tree plantation programme on 4 June 2014 to coincide with the World Environment Day at its premises. On this occasion, twenty seven saplings of various varieties like Sodom apple (*Calotropis procera*), Kadam (*Neolamarckia cadamba*), Jackfruit (*Artocarpus heterophyllus*), Fig tree (*Ficus racemosa*), Awala (*Cicca acida*), Adhatoda (*Justica adhatoda*), Arjuna (*Terminalia arjuna*), Banyan (*Ficus benghalensis*), Palash (*Butea monosperma*), etc. were planted in a garden

being developed as Nakshatra Garden in the CSIR-NCL campus. Dr. Sourav Pal Director, CSIR-NCL inaugurated the function by planting a sapling of Vet (Rattan) Palm tree. The Nakshatra Garden is an ancient approach to maintain the biodiversity.



Dr. Sourav Pal planting a sapling

CSIR-National Environmental Engineering Research Institute (NEERI), Nagpur

The World Environment Day was celebrated at CSIR-National Environmental Engineering Research Institute (CSIR-NEERI) on 5 June 2014. Dr. Ehrlich Desa, Distinguished Scientist, CSIR was the Chief Guest on this occasion.

While delivering the World Environment Day Lecture 2014 in the NEERI Auditorium, Dr. Desa said that due to global warming the seas are rising; we must stop contributing to the rise. The most dramatic losses will be felt by the Small Island Developing States that are in danger of losing territory, in some cases to the point of having to relocate, he added. Dr. Desa said that these embattled nations, hotspots of ecological and cultural diversity, raise impassioned voices at annual Climate Change Conferences and during discussions at major international meetings. But globally, policies enacted by nations remain ineffective with a lack of apparent will to take the hard local decisions to enact clean air practices, he added.



Dr. Ehrlich Desa, Distinguished Scientist, CSIR delivering the World Environment Day Lecture 2014

Dr. Desa warned that by 2100 the sea level could rise by two meters, and if this happens, Maldives, Kiribati and Tuvalu will be lost. He informed that the 20th century saw sea levels rise 19 cm – the highest in 2000 years. The last 20 years saw further increase to 4.76 cm (including thermal expansion, glacier changes, Greenland ice

sheet, Antarctic ice sheet and land water storage).

Dr. Desa cautioned that if we do not take appropriate action today to mitigate green house gases, average temperature of atmosphere will rise by 4.2°C. Sustainable development and community participation are vital for combating such a grim situation, he added. He said that we need to ensure that our government implements adaptation and mitigation programmes that will shield us

from future temperature rises in the atmosphere. We need to do this by raising awareness, ensuring compliance, and through our actions at the national, institutional and individual scales lead the world as a responsible nation, he added.

Earlier, while delivering the welcome address, Dr. S.R. Wate, Director, CSIR NEERI emphasized on the need to reduce green house gas emissions in the country.

Honours and Awards

Carbohydrate Excellence Award for CSIR-CFTRI Scientist



Dr.G.Muralikrishna (left) receiving the Carbohydrate Excellence Award

Dr. G. Muralikrishna, Chief Scientist, CSIR-Central Food Technological Research Institute has been awarded the Carbohydrate Excellence Award for the year 2013. The award instituted by the Association of Carbohydrate Chemists and Technologists, India was given away at the “International Conference on Challenges in Chemistry and

Biology of Carbohydrates” – Carbo-XXVIII – held recently at Dehradun.

Dr. Muralikrishna, a carbohydrate chemist of repute, has delineated the structure-function relationship of many dietary fibre components and non-digestible oligosaccharides derived from cereal brans and pulse husks. He has more than 60 peer-reviewed publications and several patents to his credit and is the recipient of prestigious awards such as Laljee-Godhoo Smarak Nidhi (2002) and AFST(I) Fellow (2008) by the Association of Food scientists and Technologists (India) for his outstanding work on carbohydrates and their degrading enzymes.

He has guided eight PhDs and delivered several lectures in National and International Symposia. He is an Advisory Board Member for the E-Journal *Trends in Carbohydrate Research* and peer reviewer for more than 12 international journals.

National Geoscience Award to CSIR-NGRI Scientist

Dr. Nimisha Vedanti, Senior Scientist CSIR-NGRI, Hyderabad, was awarded the prestigious *National Geoscience Award* (earlier known as the National Mineral Award) by the Ministry of Mines, Govt. of India for

the year 2012 for her significant contributions in the field of Hydrocarbon Exploration.

Dr. Nimisha received her M.Sc. Tech. in the year 2000 in Exploration Geophysics from the Banaras Hindu University, India and

a Ph.D. (2007) from Osmania University, Hyderabad. She held a postdoctoral position (2007-2008) at the University of Texas at Austin, USA under the BOYSCAST fellowship, Govt. of India.

Presently, she is leading an Indo-Norwegian collaboration project on Enhanced Oil Recovery in an Indian oil field and sub-basalt imaging project for prospect hunt in western India and adjoining offshore regions.



Dr. Nimisha Vedanti, Sr. Scientist receiving the National Geoscience Award 2012 from the Minister of Mines, Govt. of India

***Bharat Shiksha Ratan* awarded to CSIR-CEERI Scientist**

Dr. Jamil Akhtar, Chief Scientist and Head, Sensors and Nano-Technology Group at CSIR-CEERI, Pilani was awarded the *Bharat Shiksha Ratan* by the Global Society for Health & Educational Growth (GSHEG), New Delhi on 10 February 2014 on the occasion of the National Seminar on “Individual Achievements & National Development”. The award was given by Ex-Chief Election Commissioner of India Dr. G.V.G. Krishnamurthy.



Dr. Akhtar started his career as a Research Scholar at CSIR-CEERI, Pilani in 1980 and has a PhD from JNU, New Delhi. Since 1983 he is serving as scientist at CSIR-CEERI, Pilani and presently heading the Sensors and Nano-Technology group. Dr Akhtar is also associated with the Academy of Scientific and Innovative Research (AcSIR) New Delhi as Professor and coordinates Advanced Semiconductor Electronics (ASE) stream for M.Tech and PhD, at CSIR-CEERI. More than 14 PhD students have been working under his guidance for their thesis work.

Dr. Akhtar has contributed significantly in the area of Semiconductor Device fabrication technologies. More than 50 Research papers in SCI journals and more

than 90 Conference papers have been published under his leadership. Dr Akhtar has been instrumental in imparting hands-on training in MEMS at national level to faculties from Engineering Institutions and Central Universities including IITs and NITs.

He is a member of IEEE (USA) and life member of Institution of Electronics and Telecommunication Engineers (IETE), Indian Physics Association (IPA), Indian Nuclear Society (INS) and Instruments Society of India. He is recipient of *Bharat Jyoti* of IIFS New Delhi, DAAD Fellow of Germany and Alumni of TU Munich, Germany. He is involved in many national and International committees as expert for R&D in Devices and Sensors.



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 & Bio-technology* 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 bi-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

CSIR-NISCAIR Scientist Appointed Fellow of South African Institute

Mr Gauhar Raza, Chief Scientist and Head of the Science Communication through Multimedia (SCM) Division of the CSIR-National Institute of Science Communication

and Information Resources (NISCAIR), New Delhi has been appointed a Fellow of the Mapungubwe Institute (FMI), South Africa.

The Mapungubwe Institute for Strategic Reflection (MISTRA) provides a platform for researchers, academics and intellectuals to work together to advance South Africa's

development. Mr Gauhar Raza would be contributing to MISTRA's research project on *The Philosophy of Chinese Civilisation: The Rise and Decline and Rise of Civilisations*.

An electrical engineer by qualification, a scientist by designation and a science communicator by passion, Mr Raza has initiated research on Public Understanding of Science in India and has conducted large-scale PUS surveys. His area of expertise includes Science Communication and Cultural Studies, with almost 30 years of experience in conceiving, formulating and executing national and cross-country research projects, dissemination of research results through books (eight), papers (27), reports (17) and video documentaries (24).



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