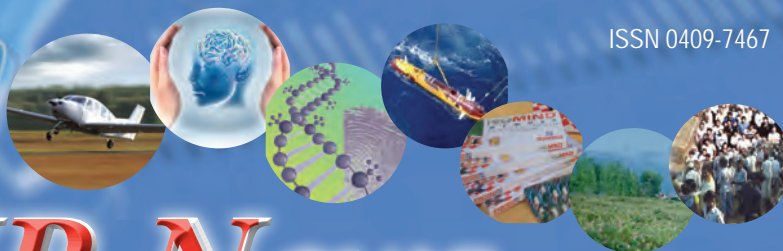




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# CSIR News

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## In The News

### CSIR Ranks 12th in the World Among Government Institutions



**THE** Council of Scientific & Industrial Research (CSIR) has been ranked 12th in the world among the government institutions in the world, improving its position after being at the 14th spot for three consecutive years, according to the 2016 report of the prestigious Scimago Institutions Rankings. The overall global ranking of CSIR also improved from 110 to 99th position.

CSIR leads the country at the top spot and is the only Indian organization to have found a place among the top 100 global institutions.

The Scimago Rankings is a classification of academic and research related institutions ranked by a composite indicator that combines three different sets of indicators based on research performance, innovation outputs and societal impact measured by their web visibility.

A constituent institute of CSIR, the CSIR-National Institute for Interdisciplinary Science and Technology (CSIR-NIIST), based in Thiruvananthapuram has been ranked first among Indian government research

institutions, improving its global overall ranking from 425 to 353. The CSIR-NIIST became the first among 59 ranked government institutions in the country,

followed by CSIR-National Chemical Laboratory (CSIR-NCL), Pune and Indian Institute of Chemical Technology (CSIR-IICT), Hyderabad.

## LCA Tejas Inducted into IAF - CSIR NAL Takes Pride in its Technology Inputs



As the indigenously developed light combat aircraft (LCA) Tejas was formally inducted into the Indian Air Force (IAF), it was not only a proud moment for the country but also for the CSIR-National Aerospace Laboratories (CSIR-NAL), Bengaluru which had designed, developed and certified the fly-by-wire flight control laws and algorithms for Tejas.

The CSIR-NAL also developed and fabricated the composite structures for the LCA Tejas, using innovative technology to keep the weight low while retaining the strength. It goes to the credit of the CSIR-NAL that the flight test program for Tejas has today successfully completed a total of over 2400 flights, carried out on 14 different prototypes by 17 test pilots over a continuously expanding flight envelope meeting the IOC 2 requirements in full.

The National Control Law (CLAW) team had implemented the autopilot modes, simulation and modeling, including wake encounter simulation and advanced parameter identification techniques for flight validation/update of the aerodynamic database leading to safe flight envelope expansion for LCA air force variants. Another notable contribution by the

CSIR-NAL has been the development of aircraft 6-degree-of-freedom simulation technology, which is a key requirement for Control Law development.

The CSIR-NAL team also piloted real-time assessments in the simulator. The CLAW team has developed and fine-tuned the simulation models for LCA-Tejas. Engineer-in-loop Simulator (ELS) is a friendly real-time simulator and a single window projection based facility developed at CSIR-NAL.

The composite wing development for Tejas was also undertaken by the CSIR-NAL, which has pioneered the development and fabrication of composite structures for the fighter, using innovative and cost-effective fabrication technologies including co-curing and co-bonding construction.

The technology developed at CSIR-NAL not only reduces the cost but also

improves the structural efficiency of the aircraft by minimizing the number of mechanical joints. With this innovation composite aircraft structures have become cost effective and structurally far superior to conventional aircraft structures.

It may be noted that the Tejas airframe is 45 per cent composites (mostly carbon-epoxy) by weight contributing to its reputation as the world's smallest light weight fighter aircraft. Composites offer a very attractive option in modern aircraft development because they are lighter than metal and just as strong.

The National Trisonic Aerodynamic facility of CSIR-NAL also houses a

1.2 m trisonic wind tunnel and every Indian aerospace vehicle has graduated out of this wind tunnel, which has completed more than 40,000 blowdowns over the past 50 years. Extensive six-component aerodynamic force and moment data needed for Control-Law development of LCA Tejas were generated in the 1.2 m trisonic wind tunnel which led to freezing of the aerodynamic design of the LCA, including sizing of wing and control surfaces.

The success of CSIR-NAL technologies in this indigenous LCA is another unique contribution of CSIR towards the Make in India programme of the Government of India.



## CSIR-IICT Develops Technology to Convert Waste into Manure

The CSIR-Indian Institute of Chemical Technology (CSIR-IICT), Hyderabad has come out with an Anaerobic Gas-lift Reactor that helps convert solid waste into biogas and bio-manure with better efficiency. The technology could be an answer to the lingering problem of solid waste management.

The novel reactor helps ensure a high rate of biogas production through appropriate mixing, biomass high density, buffering capacity, slurry concentration, microbial culture inhibition mechanisms, etc. It has much better efficiency to convert solid waste into biogas and bio-manure when compared to earlier versions of the digesters.

According to Dr. Gangagni Rao, senior principal scientist, Bioengineering and Environmental Sciences Division, IICT who along with his team developed



CSIR-IICT scientist explaining the project to his students

the technology, "Earlier versions of small conventional digesters using cattle manure to generate gas and bio-fertiliser became inoperable after a while because of accumulation of scum, choking and poor biogas quality. They could not be scaled up too."

The technology can take care of the large quantities of food waste or fruits and vegetable waste available for generating biogas. This would considerably decrease the burden on landfills thereby saving land and conserving energy.

The technology has already been patented and transferred to Ahuja Engineering Services Pvt. Ltd, to execute the projects on turnkey basis.

A biogas plant has also been tested

using poultry litter at Pedda Shivanoor, Chegunta mandal, Medak district, where for one tonne of poultry a day, 200 kg of bio-manure was produced and 89 kWh power was generated for operation of farm pumps.

Now, a Rs. 2.5 crore biogas plant has been proposed at the KL University in Vijayawada utilising up to seven tonnes of organic waste to generate power up to 300 kWh a day, besides 10 tonnes of bio-fertiliser.

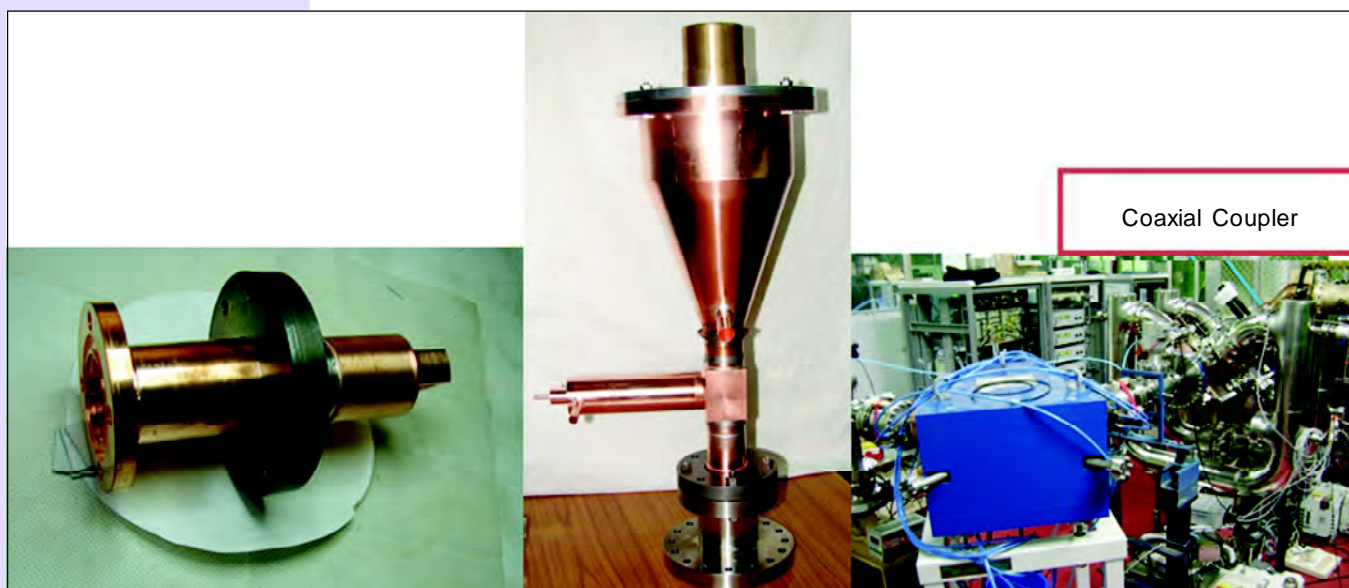
**R&D Highlights**

## High Power Waveguide RF Coupler Successfully Developed at CSIR-CEERI

CSIR-Central Electronics Engineering Research Institute (CSIR-CEERI), Pilani is collaborating with Bhabha Atomic Research Centre (BARC), Mumbai to develop a variety of coaxial and waveguide couplers for feeding high CW power from a high power RF source to Radio Frequency Quadrupole (RFQ) section of Low Energy High Intensity Proton Accelerator (LEHIPA) under development at BARC.

CEERI successfully developed uncooled and water cooled coaxial RF couplers under this collaboration and six coaxial couplers have been delivered to BARC and are being used there for RF power coupling and diagnostics.

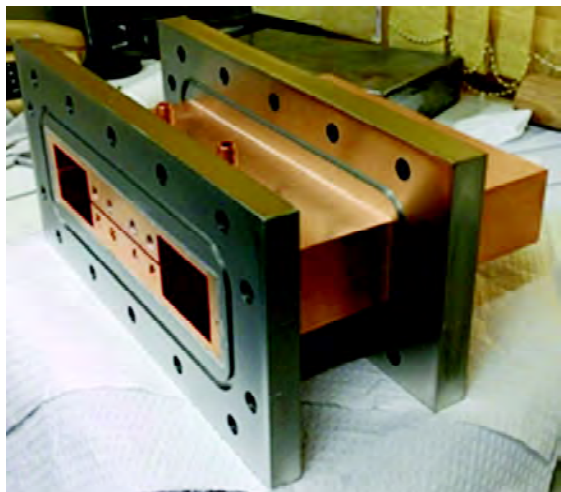
A wave guide iris coupler to be used to couple 352.2 MHz, 250 kW CW RF power to RFQ has been developed



Uncooled and Water cooled Coaxial Couplers connected to RFQ at BARC

recently under this programme. The first prototype of this coupler was tested for its suitability for ultra-high vacuum interfacing and forced water cooling by

BARC scientists on 18 February 2016 at CEERI. It has been handed over to BARC scientists for high power RF testing and user trials in LAHIPA system.



Wave guide coupler along with its test reports being handed over to BARC scientist by Shri Raj Singh, Acting Director, CSIR-CEERI

## Demolition Wastes as Raw Materials for Low Cost Construction Products

In India, projections for building material requirement of housing sector indicate a shortage of aggregates by up to 55000 million cubic meters (TIFAC ED 2003). Studies have shown that the concrete portion of the demolition waste consists of about 65-70% by volume of natural aggregate and 30-35% of cement.

Recycling of aggregates from demolition wastes as raw materials for sustainable construction products waste may bridge this gap between supply and demand. Proper recycling and management of demolition wastes can generate a high quantity of recycled aggregates which can be used further in structural concrete and building components such as bricks, blocks and tiles.

The main objective of the current investigation is to use demolition wastes

as raw materials for low-cost construction products. Therefore, the present work is focused on reuse of demolition waste as low-cost construction product by converting it into recycled coarse aggregate (RCA).

The physical and mechanical properties of recycled and natural coarse aggregates like crushing value, impact value, water absorption, specific gravity, elongation Index and Flakiness are determined in accordance with IS:2386-1963 and compared and presented in Table 1.

The cement concrete paver blocks of Grade M30 and size 200 x 160 x 75 mm have been prepared by compaction technique using different proportions of cement, sand and natural aggregate (size passing 10 $\mu$  IS sieve and retained over 4.75 $\mu$  IS sieve). The natural aggregate was

**Table 1: Physical and mechanical properties of coarse aggregate**

Sl no.	Physical properties	Natural aggregate	Recycled aggregate
1.	Type of aggregate quartzite type	Mainly waste including tile waste(less)	Mainly concrete
2.	Shape of aggregate	Angular	Angular
3.	Surface texture	Rough	Rough and porous
4.	Fineness modulus (<20mm)	6.98	6.96
5.	Fineness modulus (<10mm)	6.49	6.07
6.	Water absorption (<20mm)	0.4%	3.95%
7.	Water absorption (<10mm)	0.6%	4.07%
8.	Specific gravity (<20mm)	2.67	2.514
9.	Specific gravity (<10mm)	2.65	2.443
10.	Loose Bulk density (kg/lt)	1.452	1.289
11.	Compact Bulk density (kg/lt)	1.531	1.405
12.	Flakiness index (%)	8.178	15.838
13.	Elongation index (%)	12.241	15.857
14.	Crushing value	17.07%	26.30%
15.	Impact value	16.53%	28.57%
16.	Abrasion value	19.22%	31.98%

**Table 2: Mix proportion of paving blocks using recycled coarse recycled aggregates**

Mix Designation	Proportion (%) by weight			
	NFA	RFA	NCA	RCA
Cement				
A-0 (control)				
Top layer	33.3	66.7	-	-
Bottom layer	20.0	20.0	-	60.0
B-25				
Top layer	33.3	50.0	16.7	-
Bottom layer	20.0	20.0	45.0	15.0
C-50				
Top layer	33.3	33.3	33.3	-
Bottom layer	20.0	20.0	30.0	30.0
D-75				
Top layer	33.3	16.7	50.0	-
Bottom layer	20.0	20.0	15.0	45.0
E-100				
Top layer	33.3	66.7	-	-
Bottom layer	20.0	20.0	-	60.0

replaced by 0, 25, 50, 75 and 100% unwashed and washed recycled aggregate. Mix proportion of paving blocks using washed and unwashed recycled coarse recycled aggregates has been given in Table 2.



Figure 1 shows the photograph of the two layered interlocking paving made with recycled aggregate.

Compressive and Flexural strength of concrete paving blocks has been determined after 28 days of curing and presented in Figure 2. It can be seen that the compressive strength and flexural strength of concrete blocks decreased with replacement of natural aggregate and water absorption of the blocks



Fig 1: Two layered interlocking paving prepared from recycled aggregate

increased with an increase in the content of recycled aggregate. Moreover, an appreciable enhancement in strength of paver blocks i.e. 20% was observed with 100% washed recycled aggregate as compared to unwashed aggregate and water absorption reduced up to 9%. Further, it has also been observed that the compressive strength of all the blocks prepared using recycled aggregates meet the 28-day target strength of 36.7 MPa required for light traffic purpose as per IS: 15658. The 28 days strength of mixes BW-25 (45.2 MPa) using washed recycled aggregates is comparable.

The 28-day flexural strength of paving blocks (Fig. 2) using recycled aggregates in series I and II are higher than control specimens. Further, it is observed that flexural strength decreases with increase in recycled aggregate content. High flexural strength with recycled aggregates may be accompanied with the angular shape and rough surface of the recycled aggregates which is generally beneficial for good bond between the crushed aggregates and the cement paste to that of control mix (46.5 MPa). The strength of blocks prepared with unwashed recycled aggregates is about 9-21 % less as compared to control

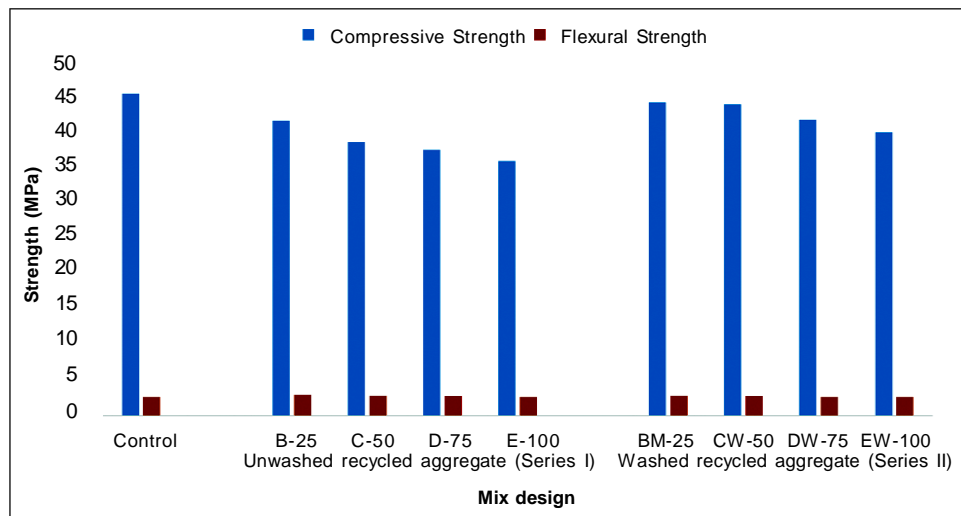


Fig. 2: Compressive and Flexural strength of concrete paving blocks determined after 28 days of curing

specimens. The mixtures B-25, BW-25, CW-50, DW-75 and EW-100 can also be recommended for medium traffic purpose as these are satisfying the minimum strength requirements of M-40 grade as per IS:15658.

From this study it was concluded that, construction and demolition waste can be used for production of low-cost building material. Different Municipal

Corporations have stated using this waste for production of building components. IL&FS Environment Infrastructure Services Limited (IEISL) set up a 500 TPD capacity processing plant in Delhi to utilize construction and demolition waste as resource material.

**Dr. A.K. Minocha and Team at  
CSIR-CBRI**

## Major and Trace Element Geochemistry of S-type Cosmic Spherules (CSIR-NIO)

Micrometeorites that pass through the Earth's atmosphere undergo changes in their chemical compositions, thereby making it difficult to understand if they are sourced from the matrix, chondrules, or calcium–aluminum-rich inclusions (CAIs). These components have the potential to provide evidence toward the understanding of the early solar nebular evolution.

The variations in the major element and trace element compositions of 155 different type (scoriaceous, relict bearing, porphyritic, barred, cryptocrystalline, and glass) of S-type cosmic spherules are investigated with the intent to decipher the parent sources using electron microprobe and laser ablation inductively coupled plasma-mass spectrometry. The S-type cosmic spherules appear to show a systematic depletion in volatile element contents, but have preserved their refractory trace elements. The trends in their chemical compositions suggest that the S-type spherules comprise of components from similar parent bodies, that is, carbonaceous chondrites.

Large fosteritic relict grains observed in this investigation appear to be related to the fragments of chondrules from carbonaceous chondrites. Furthermore, four spherules (two of these spherules enclose spinels and one comprised entirely of a Ca-Al-rich plagioclase) show enhanced trace element enrichment patterns that are drastically different from all the other 151 cosmic spherules. The information on the chemical composition and rare earth elements (REEs) on cosmic spherules suggest that the partially to fully melted ones can preserve evidences related to their parent bodies. The Ce, Eu, and Tm anomalies found in the cosmic spherules have similar behavior as that of chondrites. Distinct correlations observed between different REEs and types of cosmic spherules reflect the inherited properties of the precursors.

### Reference

Rudraswami, N.G.; ShyamPrasad, M.; Babu, E.V.S.S.K.; VijayaKumar, T. *Meteoritics and Planetary Science*, vol. 51(4); 2016; 718-742.

## Linkage between Speciation of Cd in Mangrove Sediment and its Bioaccumulation in Total Soft Tissue of Oyster from the West Coast of India (CSIR-NIO)



This study established a mechanistic linkage between Cd speciation and bioavailability in mangrove system from the west coast of India. High bioaccumulation of Cd was found in the oyster (*Crassostrea sp.*) even at low Cd loading in the bottom sediment. Bioaccumulation of Cd in the oyster gradually increased with the increasing concentrations of water soluble, exchangeable and carbonate/bicarbonate forms of Cd in the sediments. Fe/Mn oxyhydroxide phase was found to control Cd bioavailability in the sediment

system.

Cd-associated with sedimentary organic matter was bioavailable and organic ligands in the sediments were poor chelating agents for Cd. This study suggests that bioaccumulation of Cd in oyster (*Crassostrea sp.*) depends not on the total Cd concentration but on the speciation of Cd in the system.

### Reference

Chakraborty, P.; Ramteke, D.; Gadi, S.D.; Bardhan, P. *Marine Pollution Bulletin*, vol.106 (1-2); 2016; 274-282.

## Evolution of Extreme High Waters along the East Coast of India and at the Head of the Bay of Bengal (CSIR-NIO)

The recent evolution of extreme high waters along the severe cyclone-risk coasts of the Bay of Bengal (the east coast of India and Bangladesh) was assessed using long-term (24–34 years) hourly tide gauge data available from five stations. The highest water levels above mean sea level have the greatest magnitude towards the northern part of the Bay, which decreases towards its south-west.

Extreme high waters were observed to result from a combination of moderate, or even small, surges with large tides at these stations in most of the cases. Increasing trends, which are significant,

were observed in the extreme high waters at Hiron Point, at the head of the Bay. However, the trends in extremes are slightly lower than its mean sea level trend. For the other stations, Cox's Bazaar, Paradip Visakhapatnam and Chennai, no significant trends were observed. At inter-annual time scales, changes in extreme high waters in the Bay of Bengal were found to be influenced by the El Niño Southern Oscillation and the Indian Ocean Dipole.

### Reference

Antony, C.; Unnikrishnan, A.S.; Woodworth, P.L. *Global and Planetary Change*, vol.140; 2016; 59-67.

## CSIR-CIMFR Signs MoU for Ensuring Quality of Coal for Power Generation



CSIR-CIMFR has entered into an MoU with Coal Supplying Companies and Power Utilities for the quality analysis of coal being supplied to power utilities by the coal supplying companies. This collaboration will enhance efficiency of use of coal by the power sector.

Union Minister for Science & Technology and Earth Sciences, Dr. Harsh Vardhan presided over the agreement signing ceremony along with Shri Piyush Goyal, Union Minister of State (IC) for Power, Coal, New & Renewable Energy.

Dr. Harsh Vardhan, while praising the efforts of CSIR, said that the Government of India, under the guidance of the Prime Minister, is guided by the ethos of transparency, quality control and a corruption-free environment. Hence, this culture will be carried forward through the research at CSIR laboratories in the field of thermal energy generation as well and this agreement is the first step in this direction.

Shri Piyush Goyal emphasized that India is the third largest consumer of coal globally, after China and the US, and the

share of coal in its energy mix has been rising. Thermal coal accounts for around 85% of India's coal consumption and the power sector accounts for more than 70% of India's coal use. Moreover, high ash and moderate moisture content of Indian coal and the use of sub-critical technologies by over 90% of India's coal-fired fleet reduces the efficiency of its power plants to a great extent.

The mandated use of super-critical technology by the upcoming coal-fired projects in India makes it necessary for the plants to run on high energy, low ash coal. In such a scenario the signing of today's agreement assumes a lot of importance. The Minister noted that the pilot study has been going on since January this year and now a 10-year contract is being signed for future scaling up of the process.

As a part of this MoU, CSIR-CIMFR would make use of its knowledge base support in maintaining the quality of coal at the national level for the entire power sector. It is estimated that about 300 million metric tons of coal samples would be analyzed for quality per year. The contract value of the project is around Rs. 250 crores per annum.

The efforts through the aforesaid project would minimize the disagreements on quality issues between coal producers and end users. The endeavor would help the nation in sustainable energy supply and security planning for future as it may reduce the import of thermal coal.

CSIR-CIMFR is providing knowledge based support to the entire coal-based energy chain encompassing exploration, mining and impact on the

environment. Further, the laboratory is engaged in surveys of other mineral deposits and excavation for hydro-electric projects, tunnels and railways. It plays a pivotal role in establishing the national coal inventory and is involved

in maintaining the consistency of coal quality for power and other sectors leading to energy security and growth with high standards of safety, productivity and cleaner environment.



## CSIR-NAL Signs MoU with MLRIT

CSIR-National Aerospace Laboratories (NAL), Bengaluru have signed an MoU with Marri Laxman Reddy Group of Institutes that will help students and faculty of MLRIT avail research facilities of NAL, Bangalore.

MLRIT secretary Marri Rajashekar Reddy said they propose to establish research facilities to enrich the skills of students from the aeronautical, mechanical, electronics, computer science and allied branches of aerospace streams. Mr Reddy said they also want to come up with mutual research publications and industry projects for faculty and students, for which NAL director Dr. Shyam Chetty showed keen interest.



MLRIT and NAL signing MoU for extending research facilities for students

## CSIR-NISTADS Signs MoU on Climate Research

The CSIR-National Institute of Science, Technology and Development Studies (CSIR-NISTADS), signed an MoU with the Interdisciplinary Climate Research Centre (ICRC), Cotton College to promote knowledge and cooperation in addressing issues of public importance pertaining to climate change and sustainable development.

The two institutes will work together to promote research and development, including policy analysis in the areas of green growth, climate change, sustainable energy, natural resource management, capacity building, knowledge exchange and knowledge co-production.



Dr. Prashant Goswami, Director CSIR-NISTADS said, “Whether it is raising public awareness of the threat posed by dangerous climate change we

are trying to eliminate, or encouraging participation in a community scheme to foster social inclusion, we need to share our message of sustainable development and encourage participation as widely as we can. And finally, one of the big questions that countries around the world have to answer is how we can make technology work for us, and not

against us – especially when it comes to solving urgent challenges like climate change. And I am certain that ICRC, working in close collaboration with NISTADS, will be at the forefront of that challenge in this region. It is through partnerships such as the one we are launching with ICRC Cotton College today that we can share this message.”

### Symposia

## First Symposium on Advanced Functional Materials (FUNMAT-2016) at CSIR-CECRI

With the theme “Energy Conversion and Storage” the first symposium on *Advanced Functional Materials* (FUNMAT-2016) was organized at the CSIR-Central Electrochemical Research Institute, Karaikudi during 26-28 May 2016.

Meeting the ever increasing global energy demands is a challenging and daunting task and CSIR-Central Electrochemical Research Institute (CECRI) being a hub of electrochemical energy conversion and storage research provides solutions through energy-related research. Functional materials exhibiting a wide range of properties such as electrochemical, electronic, magnetic,

optical, etc. play a pivotal role in energy conversion and storage.

To popularize the research activities on advanced functional materials, the Functional Materials Division of CSIR-CECRI organized a three day symposium on advanced functional materials. The major objective of this initiative was to enrich the knowledge of research scholars with illuminating lectures by experts and to enlighten them with the avenues available in functional materials research for energy conversion and storage.

The financial support for the symposium came from Science and Engineering Research Board (SERB) of Department of Science and Technology (DST), Defence Research and Development Organization (DRDO), sponsorship from private companies and through registration fee. The invited speakers were selected covering the broad spectrum of materials research.

The symposium started on 26 May 2016 with Dr. D. Jeyakumar, Convener, FUNMAT-2016 welcoming the gathering. The symposium was inaugurated by Prof. V. Krishnan, Indian Institute of Science and Honorary Professor, Jawaharlal Nehru Centre for



Advanced Scientific Research, Bangalore.

Dr. Vijayamohan K. Pillai, Director, CSIR-SERC, in his introductory remarks, talked about the tremendous growth in materials research and touched upon the recent outcomes of materials research like Materials Genome, SunCat and Quantum Espresso.

In his inspirational inaugural address, Prof. V. Krishnan emphasized the importance of solar energy conversion that can help in meeting the global energy demand. Recapturing his own experience, he presented the global scenario of solar energy conversion in the past and present.

Dr. N. Lakshminarasimhan, Co-Convener, FUNMAT-2016 proposed the vote of thanks for the inaugural session.

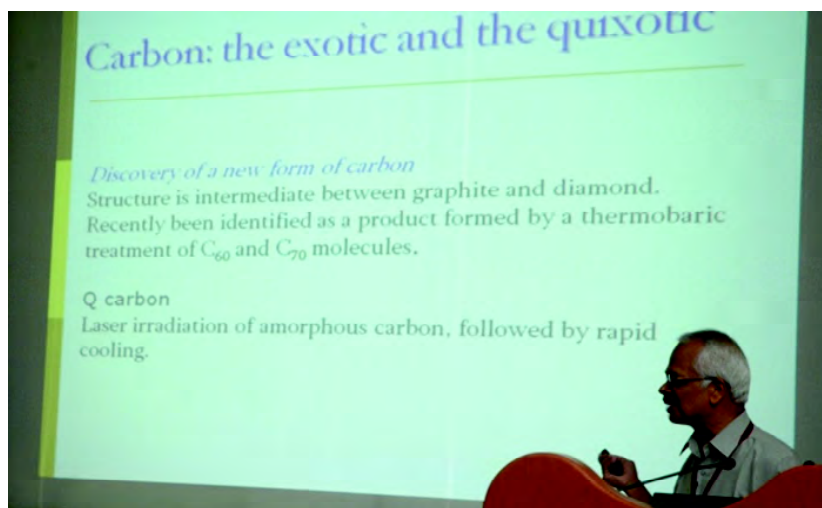
The invited lectures covered a wide range of materials used in electrochemical energy conversion like fuel cells, energy storage devices especially lithium ion batteries and supercapacitors, solar energy conversion materials for organic and dye sensitized solar cells, optical sensors and magnetic storage and magnetocaloric applications. The symposium included 16 invited lectures and 11 invited talks by experts from various fields. There were five oral presentations and 84 poster presentations by research scholars from various institutes covering the five different states in southern India.

The three-day programme also included a felicitation session to Dr. T. Prem Kumar, Senior Principal Scientist, CSIR-CECRI, an expert in the field of anode materials for lithium ion batteries. His lecture dealt with his research activities on various carbon and carbon-based materials as anodes for lithium ion batteries.

During the valediction, Dr. Vijayamohan K. Pillai, Director, CSIR-

CECRI introduced the chief guest Prof. S. Sundar Manoharan, Vice-Chancellor, Karunya University, Coimbatore and highlighted the importance of such a symposium in his concluding thoughts.

Prof. Manoharan, in his valedictory address, stressed the importance of various functionalities of materials and



functionalized materials. His address was highly motivational for the young minds to carry out their research in the area of functional materials.

Six best posters were selected theme-wise by experts and awarded with a memento and certificate. Dr. M. Sathish, Co-Convener, FUNMAT-2016 proposed the vote of thanks. The symposium ended with the National Anthem.

Lectures

## Dr. Ashok S. Juwarkar Memorial Lecture at CSIR-NEERI



Dr. Alka Chaturvedi delivering her Lecture

Dr. Ashok S. Juwarkar Memorial Lecture organized at CSIR-National Environmental Engineering Research Institute (CSIR-NEERI), Nagpur was delivered this year on 14 July 2016 at the Institute's premises.

Professor and Head of Post Graduate Department of Botany, RTM Nagpur University Dr. Alka Chaturvedi was the Chief Guest on this occasion and delivered the Dr. Ashok S. Juwarkar Memorial Lecture 2016. Delivering her lecture on 'Biodiversity and Eco-ministration', Dr. Chaturvedi said that human beings are responsible for disturbing ecosystems. Now, it is a challenge to conserve the existing biodiversity for maintaining the ecological balance, she added.

She pointed out that currently natural resources are being managed with a typical administrative approach, in an isolated manner, where one problem is solved and two more crop-up. That is why now a concept of eco-ministration is required in which certain processes should be applied for managing natural resources in a particular eco-

system. She stated that sustainable land management and ecosystem restoration activities together form a landscape approach, which manages the land, water and forest resources as one integrated system to meet an area's food security needs, ensure a continued flow of ecosystem services and promote inclusive, green growth. She informed that biodiversity plays an important role in maintaining stability and increasing productivity of the ecosystem. Wasteland reclamation, suitable land use and alternate crops could be the probable solutions for preventing the ecosystem, she said. She advocated promotion of afforestation programmes.

Earlier, in his welcome address, Director of CSIR-NEERI Dr. Rakesh Kumar, recalled the significant contributions of late Dr. Ashok S. Juwarkar. He said that the personality of Dr. Ashok Juwarkar was a source of inspiration to all. Dr. J.S. Pandey introduced the Chief Guest and Dr. Prakash Kumbhare proposed the vote of thanks.

# CSIR-NEIST Organizes Motivational Programme for School Students



(Left) Dr. D. Ramaiah, Director, CSIR-NEIST addressing the students in the inaugural session. Seated on the dais are (from left) Dr. B. K. Sarmah, Director, DBT centre, AAU-Jorhat and Dr. P. Sengupta, Chief Scientist, CSIR-NEIST present as Guests of Honour. (Right) Student participants with their teachers seen with Director, CSIR-NEIST and organizers of the program.

With an objective to motivate students towards basic science, CSIR-NEIST organized a week-long motivational programme during 7-12 April 2016 at its premises. A total of 43 students of class XII (science stream) along with 9 teachers from different schools of Assam, Mizoram and Nagaland attended the programme. The inaugural programme held on 7 April 2016 was presided over by Dr. D. Ramaiah, Director, CSIR-NEIST. Dr. B.K. Sarmah, Director, DBT Centre, Assam Agricultural University (AAU)-Jorhat and Dr. P. Sengupta, Chief Scientist, CSIR-NEIST were present as Guests of Honour.

The week-long programme included popular science talks, hands-on project work by students under the supervision of CSIR-NEIST scientists, Face-to-Face with scientists, elocution competition, visit to places of historical importance in Sivasagar district and visit to AAU.

The program concluded with a short Valedictory Programme held on 12 April 2016. Certificates were distributed to the participants and winners of the elocution competition were awarded with prizes. The programme, which received high appreciation and acknowledgement from the participants, was catalyzed and supported by RVPS, DST, Govt. of India.



Glimpses of the week-long programme

## CSIR-NEIST Imparts Training on Mushroom Cultivation

Under the CSIR 800 project titled, “Rural Entrepreneurship and Skill Development through Demonstration and Training of Appropriate Technologies of CSIR-NEIST”, CSIR-NEIST organized a series of training programmes on Mushroom cultivation during the month.

A batch of 13 nominated personnel of 5 Air Force Hospital, Jorhat received the training held at CSIR-NEIST premises on 3 May 2016. This was

followed by two programmes held on 10 May 2016 and 21 May 2016 wherein 9 AcSIR students received the training as a part of their academic curricula concerned with societal/rural issues.

The training covered detailed demonstration on cultivation practice and knowledge dissemination about the health benefits of Mushroom and its processing to produce value-added products.



Trainees from 5 Air Force Hospital, Jorhat (left) and student trainees of AcSIR (right)

## Training-Cum-Awareness Programme on Medicinal and Aromatic Plants Organised by CSIR-IIIM

CSIR-Indian Institute of Integrative Medicine (IIIM), Jammu, CSIR-Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow in collaboration with the Advance Centre for Rainfed Agriculture (ACRA), SKUAST-J organised a one day “Training-cum-Awareness Programme on Cultivation, Processing and Marketing of Medicinal and Aromatic Plants

suitable for Jammu & Kashmir State” under J&K Arogya Gram Yojana (JAAG) Project.

The training programme was organised under the guidance of Dr. Ram A. Vishwakarma, Director, IIIM, Jammu and Prof. A.K. Tripathi, Director, CIMAP.

The introductory lecture was delivered by Dr. A.P. Singh, Senior

Scientist, ACRA. He talked about the importance of cultivation of MAPs w.r.t. rainfed areas of Jammu.

IIIM Scientists Dr. Suresh Chandra, Dr. R.K. Srivastava & Shri R.P. Yadav (CIMAP), Dr. Bikarma Singh, Dr. Rajendra Bhanwaria, Dr. V.P. Rahul, Dr. Sabha Jeet and Shri Ashok Gupta, Dy. Director (ATMA) had discussions and interactions with local farmers and presented overall objectives of the ongoing project and targeted commercial crops suitable for rainfed, kandi and irrigated lands of J&K region. CSIR developed varieties such as Jammu Monarda, Rosagrass RRL (J) CN-5, Rosagrass IIIM (J) CK-10, Phalsa,

Lavendra, Palma Rosa PRC-1, Lemongrass CKP-25, Lemongrass CPK-F2-38, Vetivar, Patchouli, Geranium, Rosemary, Ocimum, and Mentha were the key crops discussed.

Farmers and growers took keen interest in adopting the cultivation of MAPs, as suggested in the training and awareness programme. The participating farmers shared their experiences of growing medicinal and aromatic crops. Planting materials and seeds were also distributed among progressive farmers and their trial technology demonstrations were performed at ACRA (Samba) nursery plots.



### National Technology Day Celebrations

## National Technology Day at CSIR-CRRI

The National Technology Day was observed at CSIR-Central Road Research Institute (CSIR-CRRI), New Delhi on 11 May 2016 to commemorate technological breakthroughs made by India. CRRI celebrated National Technology Day by declaring it an open day for the general public and engineering college students.

Mr T.K. Amla, HOD (ILT) gave a brief background of the National Technology Day celebrations. Prof. Satish Chandra, Director (CRRI) delivered the welcome address. He urged CRRI scientists/technologists to develop new technologies which are economically viable in the sector of roads and transportation. He also emphasised the need for focused R&D with defined deliverables and outcome in a short period of time, which can be implemented in the field for the benefit of the common man.



Dr. N.S. Raman, Dy. General Manager – Bitumen, Extraction & Distillation, Indian Oil Corporation (IOC) R&D Centre, Faridabad graced the occasion as Chief Guest and delivered a lecture on “Technology: A Nation’s Priority for Prosperity”.

The function concluded with the vote of thanks by Shri Sudhir Mathur, Chief Scientist (GTE).

## CSIR-NEIST celebrates National Technology Day 2016



(Left) Dr. Ch Mohan Rao, Former Director, CSIR-Centre for Cellular & Molecular Biology, Hyderabad, delivering the Technology Day Lecture as Chief Guest. (Right) Release of CSIR-NEIST Annual Report 2015-16 by the Chief Guest in presence of Dr. D. Ramaiah, Director, CSIR-NEIST.

CSIR-North East Institute of Science and Technology (CSIR-NEIST), Jorhat celebrated the National Technology Day 2016 with a special programme on 11 May 2016.

Dr. Ch Mohan Rao, Former Director, CSIR-Centre for Cellular and Molecular Biology, Hyderabad graced the occasion as Chief Guest and delivered the Technology Day Lecture. The program was presided over by Dr. D. Ramaiah, Director, CSIR-NEIST.

Speaking on the topic, “Science & Technology for Social Good”, Dr. Ch Mohan Rao gave an account of the changes that led to human civilization from the Stone Age to the modern day technology age through science. He illustrated the various contributions of India towards 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 (Rosa Kosha) etc. He also

mentioned some of the significant achievements of CSIR like indelible ink, indigenous supercomputer, Amul milk food, ground water exploration for potable water and a host of generic drugs in the healthcare sector.

Dr. Rao 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. He also recalled the message by Director-General, CSIR to all CSIR scientists earlier during the day through Video-Conference.

Later, the CSIR-NEIST Annual Report 2015-16 was released by the Chief Guest. The programme concluded with a vote of thanks rendered by Dr. S. Saikia, Sr. Scientist, CSIR-NEIST.

**Visits**

# Dr. Harsh Vardhan Calls for “Marriage” between Industry and CSIR at CSIR-CMERI



The Hon'ble Minister of Science & Technology and Earth Sciences Dr. Harsh Vardhan had an interactive meeting on 17 May 2016 with the leaders of industry and senior scientists of CSIR-Central Mechanical Engineering Research Institute (CSIR-CMERI), Durgapur to assess the needs of the industry and how CSIR as a whole and CSIR-CMERI in

particular can address those needs.

Chief executives from public sectors, Durgapur Steel Plant, Alloy Steels Plant, Eastern Coalfields Ltd., Damodar Valley Corporation, Graphite India Ltd., Alstom Projects (India) Ltd., Durgapur Cement Works, Matix Fertilizers & Chemicals Ltd. took part in the deliberation.



Glimpses of the Hon'ble Minister's visit

The Hon'ble Minister desired a 'full-fledged marriage' between Industry and CSIR Laboratories to solve among others the common peoples' problems in a simple way. He urged the industry to be courageous and own CSIR developed technologies. He cited the example of a drug for diabetes, recently developed by CSIR-NBRI, which was taken up by an industry. There are good reports about it; people are benefitting and in the process industry as well, has got benefitted immensely.

The Hon'ble Minister inaugurated the 'Control Container' developed by CSIR-CMERI for lake and sea trial of 'Remotely Operated Vehicle (ROV)', a CSIR-CMERI technology. He interacted with the scientists concerned regarding possible application and potential of the technology. Hon'ble Minister witnessed live demonstration of the technologies developed at CSIR-CMERI, Durgapur.

Dr. Harsh Vardhan applauded the efforts of CSIR-CMERI in providing

technological support to North East India and was impressed with the institute's contribution towards production of potable water and energy from waste after watching the live demonstration on 'Integrated post-harvest processing system for spices grown in North-East India', 'Cashew nut shell liquid extraction system', Water purification technologies – iron, arsenic and fluoride detection and removal', 'Plastic waste to fuel oil conversion system' etc.

The Hon'ble Minister also happily took part in a live demonstration of the tractors developed by CSIR-CMERI by being literally in the driver's seat and actually driving one vehicle. He lauded the contribution of the institute in the 'Green Revolution' with its immensely successful technological achievements – the 'Swaraj Tractor' followed by the 'Sonalika' and the 'Krishi Shakti'. He also drove the 'e-Rickshaw' developed by the institute with great enthusiasm.



Dr. Harsh Vardhan emphasized on the advice of Hon'ble Prime Minister and President, CSIR to orient research towards making the life of the common man better, providing technological solutions to the problems of the poor and downtrodden section of the society. He emphasized on the areas where CSIR-CMERI can take the lead in ensuring "Make in India" vision of the Prime Minister of India and suggested that CSIR-CMERI can contribute significantly towards providing technological solutions in areas like

agricultural machinery, solar energy, potable drinking water and energy from waste.

Earlier in his address, Dr. Girish Sahni, Director General, CSIR emphasized that the scientific community in CSIR should not be satisfied with past achievements but should constantly try to think out-of-the-box. Their goal should be to pursue new research areas which could meet the country's needs as well as put her ahead in selected technology domains related to the activities of the Institutes.



### Honours & Awards

## CSIR-NEIST Scientist receives IIME Coal Beneficiation Award 2015

Dr. Binoy K. Saikia, Scientist, Polymer Petroleum & Coal Chemistry Group, Materials Science & Technology Division, CSIR-NEIST has been awarded with the Indian Institute of Mineral Engineering (IIME) Coal Beneficiation Award (Academic/R&D) - 2015 for his contribution in the field of Mineral Engineering. The award consists of a plaque was given during the inauguration of the International Seminar on Mineral Processing Technology (MPT-2016) held on 5

January 2016 at Tata Consultancy Services (TCS), Pune.

Dr. Saikia has research interests in advanced characterization and gainful utilization of high sulphur North East Indian coals, green methods of coal beneficiation, nano-mineralogy and value addition to low quality coals.

He has published 46 papers in reputed journals (SCI) along with 5 book chapters (ISBN). He has also been elected recently as Life Member of Mining, Geological & Metallurgical Institute of India (MGMI).



**Appointments**

## Dr. V.M. Tiwari Takes Charge as CSIR-NGRI Director

Dr. V M Tiwari has taken charge as the new Director of CSIR-National Geophysical Research Institute (CSIR-NGRI), Hyderabad. He was previously the Director of National Centre for Earth System Studies in Thiruvananthapuram.

Dr. Tiwari obtained his post-graduate degree in Geophysics from the Banaras Hindu University (BHU), Varanasi and began his scientific career at CSIR-NGRI after receiving a PhD in Geophysics from NGRI and BHU. His research interests primarily focus on deciphering subsurface mass distribution and mass transport relevant to a wide range of scientific and societal applications such as elucidating structure and dynamics of different geological settings in the Indian lithosphere, variation in water storage

over Indian subcontinent and mapping of sub-basaltic sediments. Dr. Tiwari has also contributed significantly to the projects of Oil and Mineral Industries.

He is a recipient of the National Merit Scholarship; ONGC-AEG Best Thesis Award; and Young Scientist Awards from Indian National Science Academy (INSA), Council of Scientific and Industrial Research (CSIR), Department of Science & Technology, and Govt. of Uttar Pradesh; Krishnan Gold Medal by Indian Geophysical Union (IGU); National Mineral Award by Ministry of Mines, Govt. of India and Fellowship of National Academy of Sciences (FNASc.), India. He is also member of several national and international committees.




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## Dr. Rakesh Kumar is new Director of CSIR-NEERI

Dr. Rakesh Kumar has taken over as Director of the CSIR-National Environmental Engineering Research Institute (CSIR-NEERI), Nagpur. He assumed charge on 23<sup>rd</sup> May 2016. Before becoming Director, Dr. Kumar was Chief Scientist and Head of the Mumbai Zonal Laboratory, CSIR-NEERI.

Dr. Rakesh Kumar obtained M.Tech. in Environmental Science and Engineering from IIT-Bombay and Ph.D. in Environmental Engineering from RTM Nagpur University. He has a vast experience in all fields of environmental science and engineering, especially air pollution control and management,

urban air quality monitoring, emission inventory and modeling, environmental impact assessment, environmental audit, climate change and health. Dr. Kumar has notable contributions in developing technologies for reuse and recycle of domestic and industrial wastewater which brought a paradigm shift in the country.

Dr. Kumar has received awards for his outstanding contributions in Environmental Science & Engineering, among which the notable ones are Commonwealth Commission Award, UK in 1994; “Environmental Leadership Award” by US Asia Environmental Partnership and US-AID for the year 2005



for outstanding contribution in improving quality of life for the population of Asia; award for largest number of technology transfer for low cost waste water treatment-Phytorid in the year 2012; VASVIK award for 2012 for his exemplary work for urban environment improvement and sustainable technology “Phytorid” for sewage treatment for better environment; and “Hiyoshi Think of Ecology Award” in September 2015 for his work on use of ecology in solving environmental engineering problems. He has also served

as ‘Adjunct Professor’ at the Centre for Environmental Science and Engineering, IIT-Bombay.

Dr. Kumar has ten patents on pollution control devices including two international patents, and published more than 83 papers in national and international journals and 92 papers in national and international conferences. He has authored three Self Learning Books on various topics of Environmental Science and Engineering, one of them for Commonwealth of Learning, Canada.



## Dr. N. Gopalakrishnan takes over as Director, CSIR-CBRI

Dr. N. Gopalakrishnan, Chief Scientist, Structural Engineering Research Centre (SERC) took over as Director, CSIR-Central Building Research Institute (CBRI) on 26 May 2016.



Dr. N. Gopalakrishnan did his B.E. Civil Engineering from Anna University in 1984, M.Tech Structural Engineering from IIT-Madras in 1986 and Ph.D. in Structural Engineering from Indian Institute of Science, Bangalore in 2009. He worked as Design Engineer in Tata Consultancy Engineers (TCE) during 1986 to 1987. He joined the CSIR-Structural Engineering Research Centre on April 27, 1987 as Scientist ‘B’ and continued as Chief Scientist.

Specialist in the areas of Mechanics, Materials and Engineering, Dr. N. Gopalakrishnan has provided his expertise in various areas such as Structural Dynamics, Soil Dynamics, Earthquake Engineering, System

Identifications and Structural Health Monitoring, Experimental methods in Engineering and Sensors, Reinforced Concrete Structures and Structural Design of Steel and Concrete Structures.

Dr. Gopalakrishnan along with his colleagues

has filed patents including the patent for “A Process for the manufacture of a Passive Energy Device (PED) from Hysteretic Shear Polymer” in 2008, “Earthquake Protection Device for Bridges” in 2010 and “Energy Harvesting Device for SHM” recently.

He is a member of the Indian Society of Earthquake Technology (ISET). He has received several awards, including the UNDP fellowship in 1994. He was also awarded Dr. M. Ramaiah’s Prize for the Best Technical Paper for the year 2003 and again in 2008.

Dr. Gopalakrishnan has authored 61 papers, published in numerous national and international journals.

## Dr. Manoj Patairiya Joins CSIR-NISCAIR as Director



Dr. Manoj Kumar Patairiya has joined as Director of the CSIR - National Institute of Science Communication and Information Resources (CSIR - NISCAIR), New Delhi. In his earlier assignment, Dr. Patairiya was the Additional Director General, Prasar Bharati (Doordarshan/ All India Radio), where he was responsible for setting up the Kisan TV Channel to realize the vision of Hon'ble Prime Minister of India Shri Narendra Modi. He also served as the Channel Head of *DD Kisan* Channel.

A well accomplished scientist and science communicator, Dr. Patairiya has served as Adviser/ Scientist 'G' in the Department of Science & Technology, Govt. of India, prior to his assignment in Prasar Bharati.

Trained in multidisciplinary perspectives in science, technology, innovation and humanities, Dr. Patairiya holds M.Sc. and Ph.D. in biosciences, M.Sc-Tech. in Science & Technology Communication, M.B.A. in Human Resource Development, and Postgraduate Diploma in Journalism & Mass Communication. He studied Science, Technology and Innovation Policy at Harvard University, USA.

Dr. Patairiya is decorated with prestigious national and international awards including Global Science Popularization Award by Centre for Global Studies, Houston, USA; Indira Gandhi National Award by Ministry of Home Affairs, Dr. Atmaram Award by Ministry of Human Resource Development, Bhartendu Harischandra National Award by Ministry of Information & Broadcasting, Chaudhary Charan Singh National Award by Ministry of Agriculture & Farmers' Welfare, and Dr. B.C. Deb Award by Indian Science Congress, etc. Many of these awards were conferred on him by the then Presidents of India Dr. Shankar Dayal Sharma, Dr. APJ Abdul Kalam, Mrs. Pratibha Devi Singh Patil, and Vice President of India Shri Bhairon Singh Sekhawat including a recent one by present President of India Shri Pranab Mukherjee.

Dr. Patairiya has been interested in research and innovation and has two Indian Patents to his credit besides developing several gadgets, prototypes and educational aids. He has conceptualized and undertaken a number of research and development projects in collaboration with R&D institutions, universities and other government, non-government and international institutions. He has conducted training programmes, created academic courses, established Centres for Science Communication and Science Archives, organized conferences, and started special programmes on Technology Communication, Risk Communication, Spirit of Innovation, International Cooperation, etc.

Dr. Patairiya's innovative efforts towards science communication, motivational research, innovation, management, governance, and policy development have made significant impact leading to growth and development of the science and technology ecosystem. Dr. Patairiya has authored books on biotechnology, environment, and science communication, and co-edited the widely acclaimed books – *Sharing Science* and *Science Meets Communication* – and has a large number of high standard research and popular science publications to his credit.

Dr. Patairiya is pursuing a vision of cross disciplinary communication between sciences, media, governance and publics for scientific advancement and socio-cultural excellence. Dr. Patairiya's efforts have positioned India prominently on the global science communication scenario. He has been a Member of the Scientific Committee of the International Network on Public Communication of Science & Technology (PCST), Australia, Founder Editor of the *Indian Journal of Science Communication*, and Former President of the Indian Science Writers' Association. He was a Visiting Professor of Global Communication in S&T at the Chungnam National University of the Republic of Korea and serves on Editorial Boards of different research journals in India and abroad. Recently he has been elected as the Vice Chair of the International Inter-Academy Group on Science Communication which is a recognition of India's leadership position in science communication at the global level.

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Phone: 25848702; Fax: 25847062; E-mail: csirnews@niscair.res.in; hjk@niscair.res.in

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