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In The News

CSIR Tableau at Republic Day Parade 2017

CSIR@75: Touching Lives



THE contributions of the Council of Scientific and Industrial Research (CSIR) once again found resonance in a colourful tableaux displayed during the Republic Day Parade on Delhi's Rajpath on 26 January 2017. The tableaux with the theme, **CSIR@75: Touching Lives**, showcased the successful innovations of one of the largest network of scientific laboratories in the world during its journey of 75 years. CSIR participated in the Republic Day Parade for the second time after its debut in 2011 with the theme, **Healthcare: From Generics to Genomics**.

Into its 75th year now, CSIR has been playing a stellar role in building

up the scientific and technological prowess of the country. Through its technological interventions, CSIR has not only provided solutions and innovations for the industry but has also proved to be a catalyst in improving the quality of life of millions of people across the country.

The CSIR tableau, which took part in the Republic Day Parade this year depicted a few of the significant milestones of the organisation since its inception. The centre of the tableau highlighted major achievements of CSIR so far, featured as decade-wise sparks from the CSIR wheel with the support of its 38 national laboratories.



A model of the CSIR Tableau

It also highlighted its global standing – CSIR ranks 12th in the world amongst government funded institutions.

Several outstanding contributions of CSIR were depicted as three-dimensional larger-than-life size models spread across the tableau, including those related to its initiatives in pioneering civil aviation industry, developing affordable drugs, enabling provision of potable water in even remote areas, and introducing high value medicinal & aromatic plants. A modern laboratory set-up depicted CSIR's role in fostering, sustaining and upgrading the pool of specialised scientists and engineers in the country.

The front part of the tableau displayed a face placed on a laptop, depicting ideas generating in the mind and the knowledge base, thus created and appropriately used for catalysing the growth of Indian industry, improving the quality of the lives of common masses and nurturing the S&T human resource development. Beneath the face was projected the 'Drishti transmissometer' now being used at several Indian airports to measure visibility.

At the end of the tableau the model of India's first indigenously developed five-seater multi-purpose aircraft was shown taking off.



CSIR-CIMFR Discovers Shale Gas in Central India

CSIR's Dhanbad-based institute, the Central Institute for Mining and Fuel Research (CIMFR), has discovered shale gas in two areas in the Gondwana basin in Central India and Godavari basin.

The total shale gas discovered so far in the country in these two basins is estimated to be about 63 Trillion Cubic Feet (TCF). It is considered as one of the best sources of non-conventional natural gas.

Shale gas is methane gas or natural gas trapped within beds of shale rocks that occur 400-3000 metres below the earth. Shales are fine-grained sedimentary rocks that can be rich sources of petroleum and natural gas.

The new discovered reservoirs are being explored using a consortium approach in which institutions like CSIR-National Geophysical Research Institute, Hyderabad, and Coal India Limited will carry out characterisation and potential studies of the Gondwana and Damodar basins.

Shale gas, which has about 95% of methane and 2% ethane gases, can be used practically everywhere where natural gas is used. Shale gas is being mined on a large scale throughout the developed world and could contribute considerably to kitty of natural energy resources all over the world.



CSIR-NIO to Map AP Coastline

The CSIR-National Institute of Oceanography (NIO), Goa, will soon map the coastline of Andhra Pradesh and other maritime States to identify highly vulnerable areas. The beachfront along the 974-km coastline of AP would be graded based on their vulnerability.

The vulnerability analysis will identify hotspots where it would not be advisable for authorities to take up any construction activity. The special stations would be located in Andhra Pradesh, Tamil Nadu and Odisha in the first phase with trained manpower.

The vulnerability analysis and mapping would be undertaken by deploying high-tech instruments for wave and current measurements. The concentration of pollution would also be estimated. The entire study would



be taken up in collaboration with educational institutions like Andhra University and IITs.

The initial phase of the beachfront study would continue for three years. Later it would be extended to all the maritime States for another four years.

Development of Pervious Concrete: CSIR-CBRI

Pervious concrete is a kind of concrete with little or no fine aggregate and has a high interconnected porosity. Cement paste flow characteristics should be such that paste accumulation does not take place at the bottom while compacting. Volume of cement paste should be enough to bind the aggregate together and it should not fill the empty space between aggregate particles fully. This facilitates high interconnected porosity. Because of its high permeability, pervious concrete is being used widely in parking lots and pathways to allow rain/storm water runoff to permeate into the ground.

The objective of this project, undertaken by CSIR-Central Building Research Institute (CBRI), Roorkee, is to develop pervious concrete having 10-25% porosity with 10-25MPa compressive strength using locally available materials. Effect of fine aggregate content on compressive strength, porosity, abrasion resistance and split tensile strength are evaluated and discussed in this report.

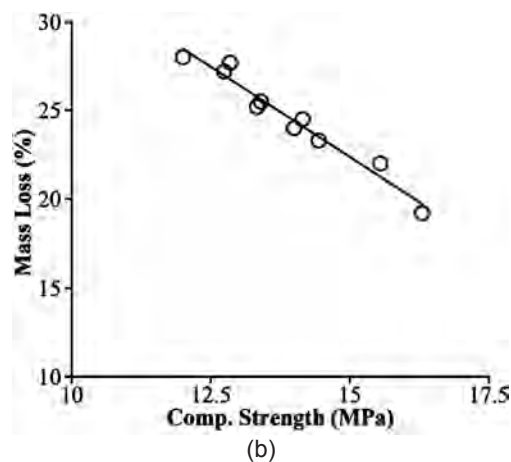
In the first series of experiments, volume of fine aggregate has been increased up to 0.1 m³ while two water-cement ratios were considered i.e., 0.3 and 0.32. In the second series, pervious concrete with water-cement ratio varying from 0.28 to 0.34 was cast with and without fine aggregate and super plasticizer. Fine aggregate content and super plasticizer dosage were kept constant at 50 kg/m³ and 0.2% of cement by weight respectively. Cement content and aggregate quantity also used were 400

kg/m³ and 1500 kg/m³ in the first series, and 500 kg/m³ and 1300 kg/m³ in the second series respectively. Ordinary Portland cement has been used. The aggregate was a mixture of 6.35-10 mm and 10-12.5 mm in equal proportions by weight. Standard cube and cylinder specimen have been cast. Compressive strength and porosity tests have been conducted as per IS 516 and ASTM C1754 respectively.

Porosity decreases with increase in w/c ratio and/or fine aggregate content when all other parameters



(a)



(b)

Fig. 1: Abrasion Resistance Test (a) Specimen after the Test (b) Mass Loss Variation with Compressive Strength in First Series of Experiments

are kept constant because the volume of solids in the mix has increased. Slight increase in strength is observed in mixes with fine aggregate when compared with mixes without fine aggregate. A cylinder specimen of the above mixes has been tested for abrasion resistance as per ASTM C 1747 and specimen after the test is shown in Fig 1(a). It is observed that mass loss decreases with increase in compressive strength as shown in Fig 1(b) and Fig 2(b).

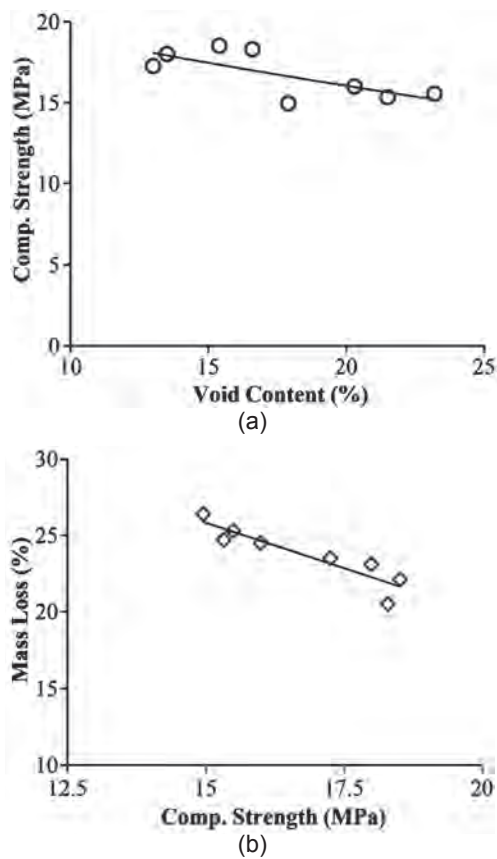


Fig. 2: Comparison of (a) Compressive Strength with Porosity (b) Mass Loss Variation with Compressive Strength in Second Series of Experiments

In the second set of experiments, the compressive strength has been found to increase lightly with a decrease in porosity as shown in Figure 2(a). Decrease in porosity was due to increase in cement mortar content when w/c ratio, super plasticizer and fine aggregate were increased.

Tensile strength of pervious concrete is also one of the important properties governing failure in the cases where the tensile stresses are also induced. Hence, the split tensile strength of the mixes of the second series was evaluated at 28 days as per IS 5816 because separate tensile test standards are not yet available for pervious concrete. It is seen that split tensile strength increases with increase in compressive strength as shown in Figure 3(b) and crack patterns in the specimen are shown in Figure 3(a).

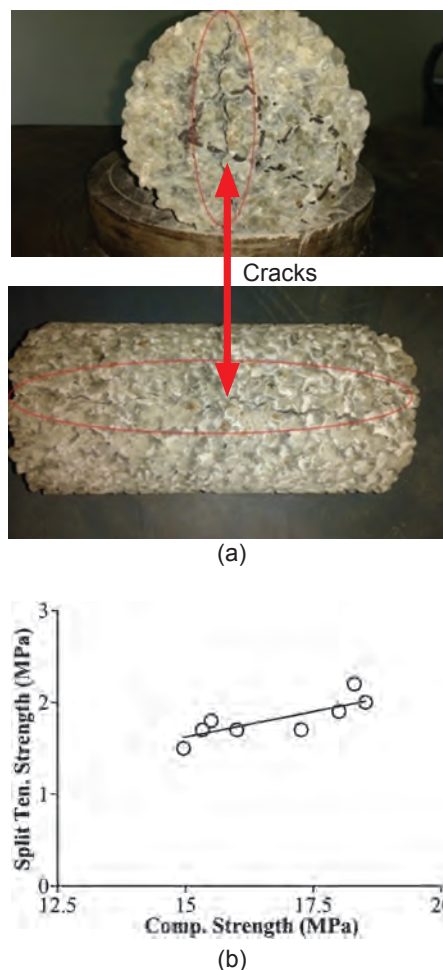


Fig. 3: Split Tensile Strength Test (a) Specimen with Cracks after the Test (b) Tensile Strength Comparison with Compressive Strength in Second Series of Experiments

Contributed by Subash Chandra Bose Gurram & Rajesh Deoliya, CSIR-Central Building Research Institute, Roorkee

Seismic Behaviour of Piles under Dynamic Lateral Loading in Layered Sandy Soil: CSIR-CBRI

Objectives of the Project:

- I. To investigate the seismic behaviour of piles subjected to dynamic lateral loading through numerical analysis and experimental model testing.
- II. To investigate the influence of various soil and pile parameters on the seismic behaviour of piles. The influence of liquefiable soil layer on the behaviour of piles will also be studied.
- III. Development of a methodology for seismic design features of piles in layered sandy soils.



Fig. 1: Uni-Axial Shake Table & its Accessories

The progress made so far:

1. The Uni-axial Shake Table of make BISS has been procured and a dynamic soil test facility with adequately designed strong floor has been created at CSIR-CBRI, Roorkee, to carry out tests to simulate earthquake conditions in the soil as shown in Fig 1.
2. Experimental model test design is completed. This includes the design of the test tank and the test piles as shown in Fig 2(a) & Fig 2(b).
3. Laboratory model test is being done on 1.4 m x 1.0 m x 1.0 m test tank for dynamic analysis.
4. Proper care was taken to nullify the boundary effects by placing PU foam and the same was verified by placing the accelerometers at different positions near



Fig. 2: (a) Model Test Tank with the Sand Specimen



Fig. 2: (b) Use of Foam to Nullify Boundary Effects

Aluminium model piles of 25 mm diameter are being used as model piles. The sand from Solani River is being used to carry out the model tests.

the boundary to check the boundary condition problem. Correspondingly, satisfactory results are being obtained.

- Pile groups in loose and dense sandy soils, subjected to combined axial and lateral loading has been numerically modelled with the help of PLAXIS3D FEM software. The numerical model has been validated with a number of published works. The parametric studies are also being carried out at the institute to study the influence of lateral loading on pile foundation in a seismic condition. The soil has been modelled using linear elastic perfect plastic Mohr-Coulomb model. This model involves five input parameters, i.e. Young's modulus E and Poisson's ratio ν for soil elasticity; friction angle (Φ), cohesion (c) and dilatancy angle (Ψ) for soil plasticity.
- Literature review of the present work is carried out continuously to keep up the knowledge base of the project.

Results and Discussions:

- The pile group carrying a lateral load was numerically modelled in PLAXIS 3D. The validation of the 3x3 pile group numerical model was carried out with the published results of Comodromos *et al.* (2009), Ercan *et al.* (2010), and Turan *et al.* (2015) as shown in Fig 3(a) & Fig 3(b). The soil is modelled using elastic perfectly plastic Mohr-Coulomb model. The pile is modelled as beam element with the properties of concrete as described in the published literatures.
- To model the pile behaviour in case of earthquakes, the validation

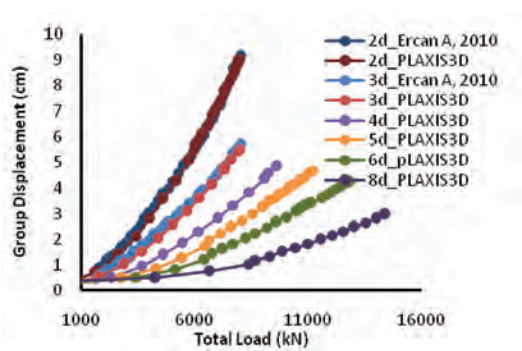


Fig. 3: (a) Close Matching of the Pile Group Displacement as per Ercan *et al.* (2010)

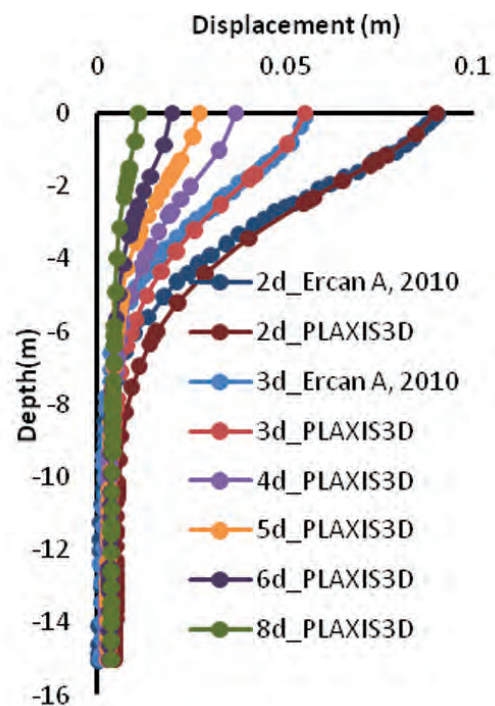


Fig. 3: (b) Close Matching of the Pile Head Displacement as per Ercan *et al.* (2010)

of the numerical model, built using PLAXIS3D Dynamic was carried out with the published work of Jesper *et al.*, 2010. The lateral load on the pile foundation of an LPG Storage Tank in case of an earthquake was matched with the results of PLAXIS3D Dynamic as shown in Fig 4.

- Parametric study is being carried out for 3x3 groups of piles. The pile cap is properly designed according to BS 8110 Part 1:3.11.4.1(5). The pile cap dimension is chosen as



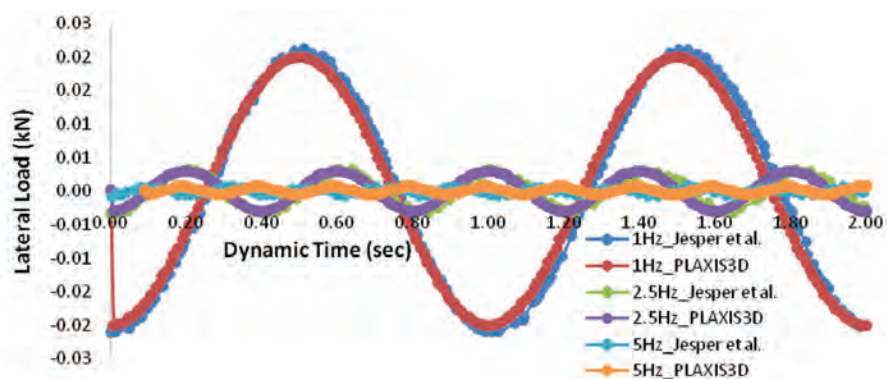


Fig. 4: Validation of PLAXIS3D Dynamic with the Results of Jesper et al. (2010)

2300x2300x900 mm and the pile diameter and the length are taken as 0.5m and 10m respectively.

4. From the analysis of results, it has been observed that due to the shadowing effect, the leading pile row carries 80% of the load as compared to the load it would have carried as a single pile. Middle row carries 30% of the

load and the trailing pile row carries the 50% of the load. So, the pile group behaviour can be explained through p-multiplier approach.

Contributed by Piyush Mohanty, Manojit Samanta, Dalip Kumar & Zamir Ahmad, CSIR-Central Building Research Institute, Roorkee

CSIR-NAL Develops Ceramic Substrates for Electronics, Oxygen Sensor and Solid Oxide Fuel Cell Applications

Ceramic substrates are used for a wide range of applications in electronics, including thin and thick film microelectronics, high power and high frequency circuit RF/microwave components and capacitors or resistors. For such applications, the ceramic substrates should possess good mechanical strength and abrasion resistance, high thermal conductivity, excellent electrical insulation and stability in high temperature and corrosive chemical environments.

Alumina and Aluminium Nitride (AlN) are well known electro-ceramics which are being used as substrates for electronic packages, heat sinks, IC packages, microwave

device packages, etc., due to their unique properties as listed in Table 1. Globally, it is predicted that the sales of space electronic substrates will reach USD 184 million by 2017 and, in particular, Chip Scale Package (CSP)-LED ceramic substrates market is expected to be USD 700 million by 2019. To date, these substrates are being mostly imported in the country and the main method used for the manufacture of ceramic substrates with precisely controlled thickness and consistency is the tape casting technique.

Other ceramic substrates like Yttria Stabilised Cubic Zirconia (YSZ), Scandia Stabilized Zirconia (ScSZ), NiO-YSZ, glass sealant,

Table 1. Properties of some important ceramic substrates

Materials	Al ₂ O ₃ (99.6 %)	AlN
Thermal conductivity (W/m.K)	29.5	160-190
Thermal expansion coefficient (x10 ⁻⁶ /°C)	8.2	4.6
Dielectric strength (kV/mm)	18.0	17.0
Dielectric constant (at 1MHz)	9.9	9.0
Loss tangent (at 1MHz)	< 1x10 ⁻⁴	2 x10 ⁻³
Volume resistivity (Ω cm)	> 10 ¹⁴	> 10 ¹⁴
Flexural strength (MPa)	500	> 350



Gadolinia Doped Ceria (GDC), etc. find applications in Solid Oxide Fuel Cells (SOFC). There is also a great demand for thin YSZ and Al₂O₃ ceramic substrates for the fabrication of oxygen sensors.

CSIR-National Aerospace Laboratories (CSIR-NAL) in partnership with M/s. Carborundum Universal Ltd. (CUMI) has developed 100 and 250 μm thick Al₂O₃ and YSZ tapes (Fig. 1) and is now in the process of transferring the technology to CUMI. The properties of the developed Al₂O₃ and YSZ substrates are at par with the imported substrates.

The NAL team has also developed expertise in the fabrication

of free standing ceramic substrates with various thicknesses using both aqueous and non-aqueous based slurries. Currently, these substrates are being used for the fabrication of amperometric oxygen sensor in collaboration with Defence Bio-Engineering and Electro Medical Laboratory (DEBEL).

CSIR-NAL has also developed tapecasting grade powders and process for technologically important tapecast products like doped Al₂O₃, GDC, ScSZ, glass sealant, etc. Among these, ScSZ is considered as the futuristic electrolyte material for SOFC which has a large market potential.

For carrying out all these activities, a customised tape caster was fabricated in-house. Dense AlN tapes are in high demand for space electronic packaging application and it is of paramount importance to develop this technology in the country. Currently, CSIR-NAL is in the process of developing AlN substrates for ISRO. With the transfer of technology from CSIR-NAL to M/s. CUMI, the company will be in a position to cater to the ceramic substrate requirement of the country's electronics industries and thus bring in self-reliance.

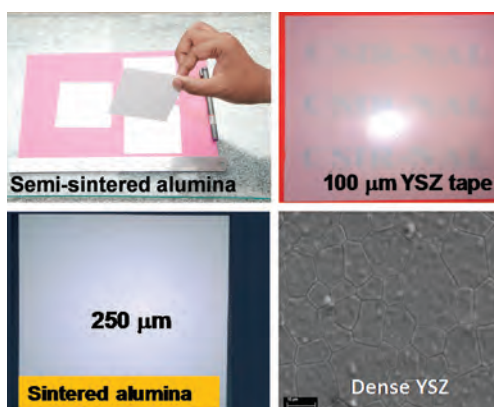


Fig. 1: Photographs showing the free standing ceramic tapes of alumina and YSZ along with the dense microstructure of YSZ

CSIR-NCL Signs MoU with University of Bradford



Prof. Ashwini Kumar Nangia, Director, CSIR-NCL and Prof. Brian Cantor, Vice Chancellor, University of Bradford exchanging the MoU agreements

CSIR-National Chemical Laboratory (CSIR-NCL), Pune, entered into a Memorandum of Understanding (MoU) with the University of Bradford (UoB), Bradford, United Kingdom on 11 November 2016.

The purpose of the MoU is to strengthen collaboration across the University of Bradford and CSIR-NCL in the area of Advanced Materials and Healthcare Technology. The ambition is to co-establish a UK-India Centre for Innovation and Commercialisation

in the area of Healthcare Technology. CSIR-NCL and UoB have established strong linkages through UK India Education Research Initiative and EPSRC-funded projects, which will be further strengthened. The MoU was signed by Prof. Ashwini Kumar Nangia, Director, CSIR-NCL and Prof. Brian Cantor, Vice-Chancellor, University of Bradford.

The focus of the collaboration will be to strengthen research capabilities in the area of advanced material science and accelerate innovation.

CSIR-NCL and Ross Lifescience Sign MoU for Developing Novel Insect Repellents

CSIR-National Chemical Laboratory (CSIR-NCL), Pune, signed a Memorandum of understanding (MoU) with Ross Lifescience Pvt. Ltd. (RLPL), Pune, on 17 October 2016 at CSIR-NCL to develop insect

repellents/insecticides for household pests.

Various household pests can potentially result in the transmission of several infectious diseases and remain as one of the main causes



CSIR-NCL and Ross Lifescience's teams during the occasion of MoU signing



of concern for human health worldwide, particularly in tropical countries like India. New compounds were prepared and evaluated for their repellence against *Aedes aegypti* (dengue and Zika virus vector) at CSIR-NCL.

CSIR-NCL and RLPL through this MoU propose to conduct further research towards developing an insecticide/insect repellent product for controlling household pests such as mosquitoes, houseflies, bedbugs, ticks, etc. RLPL will conduct bioefficacy and persistency of selected compounds prepared

at CSIR-NCL on household pests. It will also facilitate both institutions to jointly apply for financial assistance from national/ international funding agencies.

The RLPL team comprising Dr. Nitin Ghatpande and Dr. Swati Vitonde was led by Dr. Kedar Deobhankar, CEO, Ross Lifescience Pvt. Ltd. Dr. A. Sen and Dr. D. S. Reddy, scientists from CSIR-NCL along with their team executing this project were present. Prof. Ashwini Kumar Nangia, Director, CSIR-NCL was also present during the MoU signing.

Events

Two-day Crystallography Outreach Programme for Students at CSIR-NCL

CSIR-National Chemical Laboratory (CSIR-NCL), Pune, organised a Two-Day Science of Crystallography Outreach Programme for students from local schools and colleges on 3-4 January 2017.

Prof. Ashwini Kumar Nangia, Director, CSIR-NCL gave the opening remarks and informed the students about CSIR and the contributions made through its various labs located all over India. He introduced CSIR-NCL talking about the purpose of

the foundation of the laboratory. He showed the students a video about a train that runs on Hydrogen Fuel cell. He said, "The simplest chemical reaction is of Hydrogen and Oxygen giving water plus electrons; that is the chemistry to make the fuel cell which will provide the energy in a regenerative renewable way known to be a clean and silent alternative to fossil fuel."

A few CSIR-NCL scientists spoke on the significance of crystallography

in modern science as part of this outreach programme.

Dr. Rahul Banerjee talked on the subject “Crystallography Matters!” He clarified to the students about what are crystals and what are not. He introduced the International Union of Crystallography (IUCr), an association that is committed to promote international cooperation in crystallography and to contribute to all aspects of crystallography, and explained why and how it came into existence. He also informed about the 24th Congress and General Assembly of the International Union of Crystallography, which is going to be held for the first time in India (Hyderabad) in August this year.

Dr. Rajesh Gonnade spoke on the historical aspects of crystallography explaining the whole journey of the development of crystallography. He talked about personalities who had contributed significantly to this field right from Abbe Haüy, the Father of Crystallography and many others like W.H. Wollaston, Gabriel Delafosse, Christian Samuel Weiss, Auguste Bravais, William Barlow, etc. He informed them about the discovery of X-Ray Diffraction by Wilhelm

Roentgen, 1st diffraction experiments (1912) carried out by Prof. Von Laue with his assistants, Paul Knipping and Walter Friedrich. He explained how Henry Bragg (father) and Lawrence Bragg (son) analysed the X-ray diffraction pattern of a crystal (1913) and determined the accurate position of atoms within it that unravel the three-dimensional structure of a crystal. He said that the utilisation of X-ray for the diffraction experiment by Prof. Laue and analysis of X-ray diffraction pattern by the Braggs were the major scientific breakthroughs in 1912-1913 that marked the dawn of modern crystallography. He carried out an interactive session asking many questions regarding crystals, symmetry, periodicity, X-rays, diffraction, etc. Students also responded enthusiastically.

Dr. Kiran Kulkarni gave a talk on “Biology in the Light of X-rays”. He highlighted the revolution in understanding life explaining biological complexities, different metabolic pathways, complexities with reductionism and many others. He said that life is comprised of the smallest atoms; he said that the three-dimensional structure of crystal in space defines the chemical and physical properties of the molecule. He also talked to the students about proteins, their properties and protein crystallography. He shared with students how the double helical structure of DNA was discovered apart from many structures such as haemoglobin, myoglobin, insulin, urease, pepsin, lysosomes, etc. with their compositions and discoveries. He also talked about the revolutionising of



Students from local schools attended the seminar



One of the successful students receiving the prize for the quiz competition

the industry and how the GPCRs, the master regulators, are being used in pharmaceutical industries.

Prof. Ashwini Kumar Nangia also gave a talk on “From Polymorphs to Pills”. He said that polymorphs are to molecules what the allotropes are to elements. He shared some of the short stories regarding breakthrough

knowledge and its utilisation. He talked about the Son and Father story of William Henry Bragg and William Lawrence Bragg. He concluded his talk saying, “Research is a very interesting profession in which you are chasing success surrounded by failures. It is the very basic nature of Science.”

Earlier, Dr. B. L. V. Prasad gave the welcome remarks. Students also visited the laboratory and interacted with scientists in an enthusiastic manner. More than 300 students attended the seminar. A quiz competition was also conducted as a part of the Outreach Programme and prizes were distributed to the successful students at the hands of Prof. Ashwini Kumar Nangia.



Lectures

Prof. Ashutosh Sharma delivers the CSIR-NCL Foundation Day Lecture

CSIR-National Chemical Laboratory (CSIR-NCL), Pune, celebrated its 67th Foundation Day with a lecture delivered by Prof. Ashutosh Sharma, Secretary, Department of Science & Technology, Govt. of India, New Delhi, on the subject “Science, Technology and Innovation: Closing the Circle of Knowledge”.

Prof. Ashutosh Sharma initiated his talk saying that scientists convert some of the resources into some knowledge; some of this knowledge has to be converted back to resources to be sustainable in good sense. He discussed the role of creativity, out of the box thinking, common sense in doing science and inventions. He suggested to the younger students present in the hall that thirty percent



Prof. Ashutosh Sharma, Secretary, Department of Science & Technology, Govt. of India delivering the talk

of our time must go not only for incremental work but for some more profound thinking where you can challenge the foundations of what you have learnt. It would be far more fruitful to look for things where you find contrary



Prof. Ashwini Kumar Nangia, Director, CSIR-NCL felicitating Prof. Sharma

examples, the things that do not fit in what we know.

Prof. Sharma talked of the lessons of doing science highlighting many issues. It's the simplicity that cracks the problems for us not the complexity. In order to find the solutions to real problems we need to be able to communicate across different boundaries of science. Nowadays, the focus has shifted to the people; we have to think about the issues of people to solve them with the help of Science and Technology. He talked about the power of lateral thinking, creativity and even common sense in solving scientific problems. Creativity is connecting the dots of knowledge which have not been connected before.

Prof. Sharma reminded all of the quotation, "In the sky, there is no distinction of east and west; people create distinctions out of their own minds and then believe them to be true." He shared the story of the discovery of graphene-single layer of carbon atoms to understand that what we retain is good, but what we discard may be far more important. He opined that technology has to

be portable considering fabrications of small things. Technology should not have limitations. He talked about the Academic Scientific Social Responsibility of people working in the labs and institutions for which we must contribute.

Prof. Sharma focused on the processes in innovations, how to convert this knowledge into resources for the society. He discussed the cycle of discovery, invention and innovation to figure out the sustainable knowledge explaining the twin pyramids of Knowledge and Innovation. He informed everyone about the DST programmes for sustainability, especially DST NIDHI: An Umbrella Program 2016 for the Innovation Chain.

Earlier, Prof. Ashwini Kumar Nangia, Director, CSIR-NCL gave the welcome remarks and introduced the speaker Prof. Ashutosh Sharma to the audience.

On the occasion, the NCL Research Foundation (RF) awards were also distributed to the staff from the Lab at the hands of Prof. Sharma. NCL RF Scientist of the Year Award was given to Dr. Mugdha Gadgil for

her research on the development of processes for manufacturing recombinant protein therapeutics using animal cell cultures. NCL RF Technology of the Year Award was given to Dr. Amol Kulkarni and

Dr. Vivek Ranade for successful licensing of Continuous Flow Reactor Designs to Amar Equipment Pvt. Ltd. Many other awards were also presented to deserving staff members.



Dr. Shekhar Mande Delivers Public Lecture at CSIR-NCL



Prof. Ashwini Kumar Nangia, Director felicitating Dr. Shekhar Mande, Director, National Centre for Cell Science



Dr. Shekhar Mande giving away the science outreach special talk

CSIR-National Chemical Laboratory (CSIR-NCL), Pune, organised the India International Science Festival (IISF) Science Outreach Programme jointly with Vijnana Bharati, Pune, on 2 December 2016. Dr. Shekhar Mande, Director, National Centre for Cell Science (NCCS), Pune, delivered a science talk on “**The Role of Interdisciplinary Sciences in Modern Biology**”.

Dr. Shekhar Mande talked about the objectives of the Science Festival, which were to take science to the common people, to make them aware about what we do in the science laboratories and to encourage the students. He said that today’s biology that we practice in the laboratories is in fact influenced by several other interdisciplinary science branches, including Mathematics, Chemistry, Physics, Engineering, etc. He told

the students, which branch they are going to choose after their twelfth – maths or biology – is an artificial concept. The boundaries between these subjects are blurring; we cannot characterise them particularly.

Dr. Mande gave an example of the planetary system to explain to the students about planetary motions and talked about the power of observation. He said, “Most of the science is practiced by observation. Once you have observed something, try to explain what the observation is about and once you have made a certain hypothesis, go back and do the hypothesis to test your observations.”

He explained how Charles Darwin through his observations put forward the Theory of Natural Selection. He opined, “Modern Biology was essentially begun from this essential work of Darwin.” He focused on the



Dr. Shekhar Mande inaugurated the water purification facility at CSIR-NCL



Visit of School Students to the labs and facilities

emerging paradigms of the modern practice of science highlighting the integration of all branches of sciences. Further, Dr. Mande talked about the landmark science breakthroughs of several popular scientists, including Gregor Mendel, Erwin Schrödinger, Max Delbruck and many more.

Dr. Mande talked about the history of modern biology. Nature can be understood by attempting to understand the parts of it. He said one must understand the interactions among all the components of the system to understand it. Finally, he said, “Individuals behave differently than a crowd,” to emphasise the importance of social interactions in groups.

Earlier, Prof. Ashwini Kumar Nangia, Director, CSIR-NCL formally introduced the speaker Dr. Shekhar Mande. He added further, “This lecture is part of the outreach activity to convey to the people and students how science is performed in laboratories, how technologies are developed, and how scientific developments benefit the people.”

Some dignitaries working for social causes were felicitated for their contribution at the hands of Prof. Nangia and Dr. Mande. Mr Vilas Kulkarni was felicitated for having worked significantly in the area of water purification by using

clay minerals and water management of villages. The members of Sharada Shakti national movement who work towards woman empowerment through Science and Technology were felicitated. Dr. Rajesh Manerikar from Poornam Eco-Vision Foundation, a social enterprise committed to the betterment of society and the environment, was honoured for his efforts. The editorial team of *Shrushti Dnyan*, a Marathi Magazine, was felicitated for its efforts at science popularisation. Master Aalok Sathe a brilliant school student was felicitated for his science activities. Mrs Bharati Bakshi, a science teacher was honoured for her science teaching skills. Shri Mayuresh Prabhune was felicitated for his appreciable science journalism. Dagadusheth Ganapati Trust, Pune, was also felicitated.

Dr. Mande also inaugurated the water purification facility at CSIR-NCL. The water purification unit based on CSIR-NCL hollow fibre membrane technology is manufactured by a Kanpur-based start-up company Technorbital Advanced Materials Pvt. Ltd. This water purification unit will meet the daily needs of drinking water for the whole of NCL.

A visit of several school students who attended the lecture was also organised to the labs and facilities.

Honours & Awards

CSIR-NPL Scientist Receives 'APMP Award for Developing NMI-2016'



Dr. Vijay Narain Ojha receives the 'APMP Award for Developing NMI-2016' from Dr. Dinesh Kumar Aswal, Director, CSIR-NPL

Dr. Vijay Narain Ojha, Chief Scientist and Head of Time & Frequency and Electrical & Electronics Metrology Division of CSIR-NPL, has been awarded with the prestigious 'APMP Award for Developing NMI-2016'. The citation reads "In Recognition of Your Outstanding Contribution to the Development of Metrology in Your Economy".

He is the first Indian and probably the second in the Asia Pacific Region to receive this award since its inception in November 2010. This award is intended to highlight the contributions from and recognise the outstanding achievements of an individual from Asia Pacific Metrology Programme's (APMP) Developing Economies in advancing the status of metrology in their economy and/or within the region. The honour is not only to praise an individual's achievement, but also to encourage others within APMP's DEN community in the years to come.

The award consists of a plaque and was given during the General Assembly of APMP held on 16 November 2016 in Da Nang, Vietnam. Dr. Ashish Agarwal collected the award on his behalf as Dr. Ojha couldn't attend the event and it was later handed over to Dr. Ojha by Dr. D. K. Aswal, Director CSIR-NPL, at a ceremony held at CSIR-NPL.

In the last three decades, Dr. Ojha has contributed significantly in the development and establishment of India's Metrology Programme at the CSIR-National Physical Laboratory, India (CSIR-NPL). He has set up the 1 V and 10 V Josephson Voltage Standards (JVS) and programmable JVS in collaboration with PTB, Germany and NIST, USA. As 'Principal Investigator' (PI), he and his team have set up for the first time nanometrology laboratory for few parameters in India with funding of Rs. 14 crore from DeitY, Ministry of Information and Technology.

As a mentor, PI and Head of Metrology Division, he also contributed towards new activities such as development of Watt balance, the Boltzmann constant, and upgradation of existing standards at CSIR-NPL to be at par with the international level. His group was the first to have 'Calibration Measurement Capability' (CMC) approved under the CIPM-MRA in India.

He is reviewer of CMC's at APMP. He has conducted many workshops, trainings and conclaves to train more than 5000 personnel from industries, laboratories and SAARC countries in the area of metrology. He has published

more than 150 research papers in refereed journals, international and national conferences, etc. and has edited/compiled many conference proceedings/monographs related to the field of metrology, ISO and quality.

He was also awarded the Young Scientist Award of CSIR, India and URSI, Belgium, for metrology, etc. He received ADAB (APMP) fellowship to work at CSIRO, Australia, two years DAAD fellowship to work at PTB, Germany. He was a Guest Researcher at NIST, USA. He is Fellow and member of various scientific societies, committees of BIS, NABL, ISO, National Science centre, etc.

Two Scientists of CSIR-NGRI Awarded



Dr. Sahebrao Sonkamble, Scientist (Geo-Environment) at CSIR-NGRI (National Geophysical Research

Institute), has been awarded 'AHI-Phani Kishore - Young Scientist Award' by the Association of Hydrologists of India for his novel contributions to Water Resources Management.

The award has been adjudged as the best presentation by the 34th AHI Annual Convention and Symposia on 'Water Resources and Water Policies' and 'Geosciences for Sustainability' organised jointly by FIGA, IGU & IIT (ISM) at IIT (ISM) Dhanbad, during 8-10 November 2016. Dr. Sonkamble's research focuses on

recycle and reuse of wastewater using natural treatment systems on cost-effective mode.

Dr. Sonkamble was also honoured with 'Associate Fellow' by the Telangana Academy of Sciences for the year 2015 on 23 June 2016 at CSIR-NGRI, Hyderabad.



Dr. N. Satyavani, Senior Scientist of the Gas Hydrate group of CSIR-National Geophysical Research Institute (CSIR-NGRI),

was awarded the Raman Research Fellowship of the CSIR for the year 2016-2017. The Raman Research Fellowships are granted to CSIR researchers carrying out research in the emerging/high priority areas in

reputed foreign institutions/R&D Centres of Excellence.

Dr. Satyavani has published several scientific papers related to Gas Hydrate research and has been working in the area of identification of the Gas Hydrate occurrence. She is actively involved in the seismic

data processing and interpretation, having processed seismic data sets (about 20,000 lkm) pertaining to the Indian continental margin. She has also participated in scientific cruises aimed at exploration of Gas Hydrates in the Indian offshore region.



CSIR-NGRI Scientist Receives the “Savitri Chadha Memorial Award”



Dr. Shakeel Ahmed (L) receiving award from Prof. Kaptan Singh Solanki, Governor of Haryana

Dr. Shakeel Ahmed, Chief Scientist & Head of Indo-French Centre for Groundwater Research at CSIR-National Geophysical Research Institute (NGRI), Hyderabad received the Savitri Chadha Memorial awarded annually by the Indian National Committee of International Association of Hydrogeologists (INC-IAH).

The award carries a certificate, trophy, and an amount of Rs. 25000/-. The award was presented by Governor of Haryana, Prof.

Kaptan Singh Solanki at a workshop organised by the INC-IAH on 17 December 2017 at the Manav Rachna International University, Faridabad.

Dr. Shakeel Ahmed, basically an Exploration Geophysicist, joined CSIR-NGRI, Hyderabad, as Scientist B in 1982. Dr. Ahmed further obtained PhD from the Ecole Nationale Supérieure des Mines de Paris (Paris School of Mines: Now Mines Paris Tech) in France in 1987.

Dr. Ahmed's efforts in the Indo-French collaboration took a



quantum jump in 1999 with the most important event in the history of NGRI's International collaboration of setting-up of the "Indo-French Centre for Groundwater Research (IFCGR)", which he is still heading.

Dr. Ahmed's collaboration has not been limited to France. He was also invited to deliver lectures in many countries viz., Australia, Iran, Egypt, Kenya, Sudan, People's Republic of China and Pakistan as resource person sponsored by the UNESCO and CSC, etc. He led a delegation of Indian scientists to Tunisia to start and establish Indo-Tunisian collaboration in water science and technology.

Dr. Ahmed has also been the Secretary of the National Committee of the International Association of Hydrogeologists and also the Associate Editor of the *Hydrogeology Journal* published by Springer as well as Chairman of the South Asian Regional working group on Hard Rock Hydrogeology of IAH (International Association of Hydrogeologists). He is a life Fellow of the Geological Society of India, National Environmental Science Academy, Andhra Pradesh Akademi of Sciences, and Telangana State Academy of Sciences.

Dr. Ahmed has supervised more than 30 doctoral theses and published more than 150 research papers with highest citations among working scientists of NGRI.

Dr. Ahmed was honoured at the 7th Cannes International Water Symposium where he received the trophy of the International Prize for Water Sciences. Earlier, he has been the recipient of the Young Scientist Award in physical sciences awarded in 1999 by the MAAS (Muslim Association for the Advancement of Science). Dr. Ahmed bagged the first National Mineral Award (now National Geoscience Award) in Groundwater in 2006.

Recently, Dr. Ahmed completed an important project on aquifer mapping, AQUIM, establishing guidelines for 3D continuous geophysical mapping using heliborne geophysical investigation, an advanced technology applied for the first time in India. The project is expected to lead the National Aquifer Mapping programme as its up-scaling. At present Dr. Ahmed is the senior most Chief Scientist at the CSIR-NGRI, Hyderabad.

Dr. B.L.V. Prasad from CSIR-NCL Admitted as Fellow of the Royal Society of Chemistry



Dr. Bhagavatula L.V. Prasad, a Scientist from CSIR-National Chemical Laboratory (CSIR-NCL), Pune, has been honoured as the Fellow of the Royal Society of Chemistry (FRSC) by the “The Royal Society of Chemistry”, London.

Dr. Prasad completed his M.Sc. (Chemistry) from the Central University of Hyderabad; subsequently he obtained Ph.D. from the same University in 1997. He did postdoctoral research twice – first at Tokyo Institute of Technology, Tokyo, Japan and the second at Kansas State University, Kansas, US. He joined CSIR-NCL in 2003 and started his independent research group.

Dr. Prasad has made notable contributions to the area of materials

chemistry, including nanomaterials and soft materials. His group has been focusing on preparation of solution processing techniques of 2-dimensional materials, molecular self-assemblies, identification of novel nanoparticle synthetic routes, preparation of bio molecule-nanoparticle conjugates and their applications in drug-delivery systems, bio-implants and diagnostics.

Dr. Prasad has published more than 100 research papers in peer-reviewed international journals. He has filed more than 15 patents. He has so far supervised 9 Ph.D. theses and is currently guiding 9 students for Ph.D.

Dr. Prasad has been the recipient of many awards and recognitions, including the Fellow of the Indian Academy of Sciences (FASc), Bangalore, Young Career Award from DST Nanomission, Bronze Medal by the Chemical Research Society of India in 2013, Raman Research Fellowship in 2012, Materials Research Society of India Medal in 2012, and Scientist of the Year Award by the NCL Research Foundation in 2009.



Dr. Guruswamy Kumaraswamy from CSIR-NCL Elected Fellow of American Physical Society

Dr. Guruswamy Kumaraswamy, Scientist from the CSIR-National Chemical Laboratory (CSIR-NCL), Pune, has been elected as a Fellow of the American Physical Society (APS).

He has been honoured for “opening new routes to templated polymeric structures using mesophases and crystallization, and elucidating their physics”. Being elected as a Fellow of



the APS is a prestigious recognition by the international scientific community and is awarded to less than 0.5% of the membership of the APS.

Dr. Guruswamy received a B. Tech. in Chemical Engineering from IIT-Bombay in 1994 and M.S. and Ph.D. degrees from California Institute of Technology, USA in 1996 and 2000, respectively. He did postdoctoral research at the Max Planck Institute for Colloids and Interfaces, Germany and joined CSIR-NCL in 2001.

Dr. Guruswamy's research is in the broad area of soft matter that includes industrially important materials such as polymers, surfactants, liquid crystals and nanoparticle colloids. His group uses experiments to understand and design the structure and properties of such materials. His work has attracted

attention and funding from the Government of India as well as from companies such as General Electric, Procter and Gamble, Honeywell, DuPont, General Cable Corporation, Reliance, Indian Oil Corporation, among others.

Dr. Guruswamy's work has been previously recognised by the CSIR Young Scientist Award in Engineering Sciences in 2005, and the NCL-Research Foundation Scientist of the Year Award for 2012-13.

In addition to his research, Dr. Guruswamy has been actively involved in science outreach for school students and coordinates the Exciting Science Group (<http://www.excitingscience.org>). He received the NCL Director's Commendation Award (in 2010) for his efforts in promoting interest in science through the Exciting Science Group.

Dr. Rahul Banerjee from CSIR-NCL Awarded the B.M. Birla Science Prize for Chemistry



Dr. Rahul Banerjee, a Scientist from CSIR-National Chemical Laboratory (CSIR-NCL), Pune, has been awarded the B.M. Birla Science Prize in Chemistry for the year 2015 instituted by the B.M. Birla Science Centre, Hyderabad.

Dr. Banerjee's research interests include the study of structural chemistry with the flavour of chemical synthesis to design new materials for hydrogen storage, carbon sequestration, water purification and dehumidification of natural gases. His group has developed for the first time a methodology of synthesising porous covalent

organic frameworks with exceptional chemical stability for gas storage and proton conduction. This work is a major breakthrough in porous material research, as these materials have the porosity and crystallinity of Metal Organic Frameworks and also the exceptional chemical stability of traditional porous zeolites or carbons.

Dr. Banerjee received his Ph.D. degree from the University of Hyderabad, Hyderabad, in 2006. He joined CSIR-NCL's Physical and Materials Chemistry Division in 2008 after a postdoctoral work at The University of California, Los Angeles. He has published more than

120 research papers in international peer-reviewed journals, including in top notch international journals having large citations.

Dr. Banerjee is the recipient of Humboldt Research Fellowship for experienced researchers in 2016, Thomson Reuters Research Excellence-India Citation Award 2015, NASI-SCOPUS Young Scientist

Award for 2014, CSIR-Young Scientist Award 2011 and NASI-Young Scientist Platinum Jubilee Award 2011. He was also Young Associate of the Indian Academy of Sciences for the period 2009-2012. Dr. Banerjee is serving on the editorial board of journal *CrystEngComm*. He is also a Fellow of the Royal Society of Chemistry.



Dr. Rajnish Kumar Receives the NASI-Scopus Young Scientist Award

Dr. Rajnish Kumar, Senior Scientist from CSIR-National Chemical Laboratory (CSIR-NCL), Pune, has received the prestigious NASI-Scopus Young Scientist Award 2016 in the area of Chemistry. National Academy of Sciences, India (NASI) in collaboration with Elsevier, has adopted this programme to honour young researchers who are building their careers in academic research.

Dr. Kumar's research work has the potential to bring significant societal and economic benefits in strategically important areas of water and energy. The award was given for research focused on developing technology and methods to recover methane trapped in natural gas hydrates, which is considered as a potential energy resource. Dr. Kumar and his research group are working closely with industries to understand gas hydrates at the molecular level, its energy potential and to develop sustainable solutions for exploitation of marine gas hydrates reserves in India.

He is also interested in developing innovative technologies on the energy-water nexus targeting applications

relevant to Carbon Dioxide capture, seawater desalination and energy storage. His works on developing novel methods for carbon capture employing water as solvent via clathrate process has had a significant scientific impact.

Dr. Kumar completed Masters in Chemical Engineering in 2003 from Indian Institute of Science, Bangalore and Ph.D. (Chemical Engineering) in 2009 from the University of British Columbia, Canada. Later he joined the National Research Council in Canada, Ottawa, for his postdoctoral fellowship and finally moved to CSIR-NCL in 2010.

Dr. Kumar's research is both fundamental and applied in nature resulting in publications in high impact journals like *Angewandte Chemie*, *JACS*, *PNAS*, etc. He has published over 50 peer-reviewed articles in top engineering and chemistry journals. He is also a recipient of most cited paper awards for three of his publications.

This special award carries a memento, a certificate and a cash prize of Rupees Seventy Five Thousand.



Nominations are invited for

**Shanti Swarup Bhatnagar Prize for
Science and Technology 2017**

The Council of Scientific and Industrial Research (CSIR) invites nominations for the Shanti Swarup Bhatnagar (SSB) Prizes in Science and Technology for the year 2017. The SSB Prizes are to be given for research contributions made primarily in India during the past five years. The age of the nominee for the SSB Prize 2017 **should not be more than 45 years as on 31.12.2016.**

The SSB Prizes are awarded for notable and outstanding research, applied or fundamental, in the following disciplines: (1) Biological Sciences, (2) Chemical Sciences, (3) Earth, Atmosphere, Ocean and Planetary Sciences, (4) Engineering Sciences, (5) Mathematical Sciences, (6) Medical Sciences, and (7) Physical Sciences. The SSB Prize carries with it a citation, cash award and a plaque for each scientist selected for the award.

Nominations addressed to **Scientist Incharge - SSB YSA Unit, Human Resource Development Group, CSIR Complex, Library Avenue, Pusa, New Delhi 110 012** should be sent as per the prescribed proforma (Original + 2 copies) along with reprints of significant publications of the last 5 year period on or before **31 March 2017.**

Soft copy (in PDF format) of duly filled proforma and significant publications of the nominee is also required in a USB/Pen drive. The details of the SSB Prize and the prescribed proforma for nomination may be obtained from the above address or may also be downloaded from the website: <http://csirhrdg.res.in>

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