Events organized in AECS, Indore, during the Swachhta Pakhwada.

Apart from these, a competition for the 'Cleanest office of Division / Independent Section' was held and a survey for the same was conducted to further motivate the staff members to keep their offices neat and clean.

A detailed report on various activities carried out during the pakhwada is available on RRCAT website (http://www.rrcat.gov.in/organization/cat/GreenRRCAT.html#). A committee constituted by the Secretary, DAE, for evaluating the performance of the participating units awarded RRCAT the certificate of excellence with second rank among all DAE units, for its exemplary work in the pakhwada.

Certificate of Excellence with second rank to RRCAT in appreciation of the Swachhta related initiatives.

The appreciation of the Swachhta related initiatives by DAE is basically culmination of the team effort of all RRCAT employees, AECS Students and teachers, and CISF staff.

Reported by:
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N.20: RRCAT Seminars during January-June 2019

Insights into novel group IV semiconductors – from isotopically engineered materials to non-equilibrium alloys: *Dr. Samik Mukherjee, Postdoctoral Research Fellow, Ecole Polytechnique Montreal, Canada, January 14, 2019.*

In this talk, Dr. Mukherjee outlined the recent progress in the area of isotopically engineering group IV semiconductors with focus on nanoscale and quantum structures, and devices. The atomistic-level investigations of isotopically programmed nanoscale materials were presented based on laser-assisted atom probe tomography. In later part of the talk, he focued on prospect of monolithic integration of optoelectronic devices on Si-platform using Sn-rich group-IV metastable alloys. Such integration is a long-sought-after paradigm which holds the key to a myriad of opportunities in ultrafast data transfer, low-power electronics, energy conversion, and sensing, to name a few. Recent results related to the growth and atomistic-level characterization of GeSn and SiGeSn alloys were highlighted by the speaker.

Development of cryogenic engines for ISRO's launch vehicles: *Dr. Nawal Kishore Gupta, Former Deputy Director and Project Director for Cryogenics at ISRO, February 04, 2019.*

This talk covered various interesting aspects of ISRO launch vehicles and their associated developmental stories. Denial of imported technology in the 1990s proved to be blessing in disguise for ISRO scientists to develop the technology of their own, for the launch of next generation Geosynchronous Satellite Launch Vehicle, GSLV MK II and MK III. Similarly, denial of cryogenic engine had helped the country to independently develop cryogenic upper stage. PSLV is used for launching remote sensing satellites and GSLV is used for launching communication satellites. ISRO indigenously developed cryogenic engine for its launch vehicle MK III that can put 4-Tonne geosynchronous satellite in GTO.

Challenges in engineering product development: *Prof. N. S. Dinesh, Professor, Dept. of Electronic Systems Engineering, IISc, Bengaluru, February 15, 2019.*

Product development aids in self-reliance and prosperity of any country. Engineering product development is a synthesis of several disciplines. Product development is a passionate endeavour of experts from

different fields working synergistically. This involves higher-level abstraction of the problem and optimization at the implementation level. The objective of this seminar was to present the challenges in such activity. The talk threw light on some challenges faced in interesting case studies of product development in the areas of medical applications, biological applications etc. The presentation included video demonstrations of several products developed at the Mechatronics Laboratory, Dept. of Electronic Systems Engineering, IISc.

Sub-wavelength plasmonic structures for opto-electronics and sensing applications: *Dr. Shourya Dutta Gupta, Assistant Professor, Dept. of Materials Science and Metallurgical Engineering, IIT, Hyderabad, February 26, 2019.*

Sub-wavelength metallic structures, also called plasmonic metasurfaces, support plasmonic resonances that can be used to manipulate and control different properties of electromagnetic radiation. In this talk, speaker presented two different applications of plasmonic structures, namely, active opto-electronic devices and biological sensing. In the first part of the talk, it was shown how the integration of a single layer of graphene (SLG) with plasmonic metasurfaces makes it possible to actively control the resonance of the metasurface by applying a gate voltage. The second part of the talk dealt with diagnosis of cancer using plasmonic metasurfaces, specifically, how Surface Enhanced IR Absorption (SEIRA) spectroscopy can be used for diagnosis using only a few cells.

Fe-based Superconductors – 11th year of its discovery: *Dr. Haranath Ghosh, Scientific Officer G, HRDS, RRCAT, February 28, 2019.*

Discovery of Fe-based superconductors is ground breaking and seminal. Unconventional superconducting pairing mechanism (yet to be settled), orbital physics, rich Fermiology, phase diagram and several distinctly different physical properties make them overall a fundamentally different class; superconductors with not only high T_c but also with technological applications. A pedagogical introduction to these systems was presented in the talk. Structural aspects and its intimate relation to electronic structure, orbital degrees of freedom and superconductivity were discussed along with latest understanding on various challenges in these classes of materials. Speaker also presented the various possible phases that these materials exhibit, are consequence of electronic "orbital selective" correlation.

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N.21: Awards and Honours

N.21.1: Lifetime Achievement Award to Shri P. K. Kush

Shri Pradeep Kumar Kush was awarded lifetime achievement award for his outstanding contributions to the field of cryogenics engineering, and his persistent efforts for indigenous development of cryogenics technologies, by the Indian Cryogenic Council at Indian Institute of Technology Bombay (IITB), Mumbai during the National Symposium on Cryogenics and Superconductivity, on January 16, 2019. His work on indigenous development of helium liquefier was highly appreciated by the cryogenic community.

N.21.2: Award of Doctor of Philosophy (Ph. D.) Degree

The Homi Bhabha National Institute (HBNI), a Deemed University has awarded Ph. D. Degree to following employee / students of RRCAT:

1. Dr. Debashis Mondal was awarded Doctor of Philosophy in Physical Sciences on the dissertation, titled "Study of electronic properties of $FeGa_3$ and FeAl intermetallics". Dr. Tapas Ganguli was the Supervisor and Dr. Soma Banik was the Technical Adviser.

2. Dr. Adityanarayan H. Pandey was awarded Doctor of Philosophy in Physical Sciences on the dissertation, titled "Electrical and magnetic properties of magnetic ion substituted relaxor ferroelectric ceramics", which was supervised by Dr. Surya Mohan Gupta.

3. Dr. Paresh Chandra Pradhan, was awarded Doctor of Philosophy in Physical Sciences on the dissertation, titled "Fabrication and characterization of multilayers for x-ray optics applications". Dr. Tapas Ganguli was the Supervisor and Dr. Maheswar Nayak was the Technical Adviser.

4. Dr. Chitradip Banerjee was awarded Doctor of Philosophy in Physical Sciences on the dissertation, titled "Studies on electron-positron pair production via Schwinger mechanism by ultra-short and