

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 optoelectronics 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 FeGa₂ 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



ultra-intense laser pulses", which was supervised by Dr. Manoranjan P Singh.

5. Dr. Vandana Kumari Gupta was awarded Doctor of Philosophy in Physical Sciences on the dissertation, titled "Study of individual InAs nanowires using Raman spectroscopy", which was supervised Dr. Alka A. Ingale.



6. Dr. Priyanka Sharma was awarded Doctor of Philosophy in Physical Sciences on the dissertation, titled "Functional extensions of optical coherence tomography for biomedical imaging applications", which was supervised by Dr. K. Divakar Rao, BARC (Vizag).



7. Dr. Shreekant Barnwal was awarded Doctor of Philosophy in Physical Sciences on the dissertation, titled "Study on coherent soft x-ray generation from capillary discharge plasmas", which was supervised by Dr. P. A. Naik.



8. Dr. H. S. Patel was awarded Doctor of Philosophy in Physical Sciences on the dissertation, titled "Photonic nanojet for nano-scale imaging and spectroscopy", which was supervised by Dr. S. K. Majumder.



9. Dr. Mukesh Kumar was awarded Doctor of Philosophy in Physical Sciences on the dissertation, titled "Study of pickups and kickers in particle accelerators", which was supervised by Dr. V. K. Senecha.



10. Dr. Ravi Kumar was awarded Doctor of Philosophy in Physical Sciences on the dissertation, titled "High resolution x-ray diffraction study of microstructure in compressive and tensile strained III-V semiconductor epitaxial layers", which was supervised by Dr. Tarun Kumar Sharma.



N.21.3: Young Scientist Award

Shri Subhomoy Haldar, SRF, HBNI received Young Scientist Award in 34th Madhya Pradesh Young Scientist Congress, held at Rajiv Gandhi Pradyogiki Vishwavidyalaya, Bhopal during February 28 to March 1, 2019. The title of the paper was "Indigenous and inexpensive maskless photolithography system for semiconductor devices development." The award carried a cash prize of Rs. 25000, a citation and a certificate.



N.21.4: Awards in 32nd Annual Rose Show Exhibition

A competition was organized during the 32nd Annual Rose Show Exhibition by Malwa Rose Society, Department of Horticulture and Food Processing (Govt. of M.P.) and Indore Municipal Corporation at Gandhi Hall, Indore on January 19-20, 2019. RRCAT bagged following prizes under different categories:



- 1st Prize for "Best Largest Rose Garden"- in Institutional Gardens category
- 1st prize for "Best Indian HT Rose" award for variety 'ANUSUYA' in Indian Rose category.
- Championship trophy for highest points during Annual Rose Show competition 2019.
- Other prizes (14 Nos) for cut flower participation under HT, Floribunda and Polyantha Rose category.

On behalf of RRCAT, the trophy and prizes were received by Shri R. V. Joshi, Head, Horticulture Cell, CSD, RRCAT and his team.

N.22: Accomplishments of AECS, Indore

On January 26, 2019, Atomic Energy Central School (AECS), Indore received two prestigious awards, namely, *Dr. Homi Bhabha Rolling Trophy* for the best overall performance and *Dr. Vikram Sarabhai Rolling Trophy* for the best scholastic performance among all AEC Schools all over the country.