N.7: RRCAT Seminars during July 2016 to December 2016

***1. Email etiquette*:** *Ms. Savithri S. Mani, Former Director, Administrative Training Institute, Dept. of Atomic Energy*. Oct 05, 2016.

With the advancement of technology, email has become one of the main modes of communication. This being a formal form of communication, it is important that we use appropriate style and rules while using email. This short lecture was aimed at sharing important guidelines in this regard. Speaker also pointed out various errors, mistakes which are very common in routine official mails.

2. Fundamentals of Field Programmable Gate Array and Its Applications in Scientific Instrumentation: *Mr. K. M. Khare , SO/F, Laser Biomedical Applications Section*, Nov 07, 2016.

A field-programmable gate array (FPGA) is a user configurable integrated circuit that has become integral part of modern programmable digital circuit designs. FPGA technology has gained momentum over the past decade and finding applications in diverse areas. In this talk overview of FPGAs was presented. FPGA architectural details, features, FPGA based digital circuit design flow along with possible applications of the FPGA in the field of scientific instrumentation were also discussed in this talk.

***3. Atomistic Modelling of Nanocluster Based Electrodes for Fuel Cell Applications*:** *Dr. Biswarup Pathak, Associate Professor, IIT, Indore*, Nov 30, 2016.

Proton exchange membrane (PEM) fuel cells have attracted considerable interest in the area of clean energy sources due to their high efficiency, low operating temperature, stationary/ portable power supply, and zero carbon emission. The performance of a fuel cell depends mainly on the performance of the oxygen reduction reaction (ORR) at the cathode. However, the slow reaction kinetics of the ORR and the use of Pt metal as the electrodes prevent the commercialization of PEM fuel cells. Therefore, the lowering of Pt loading without compromising the performance of a fuel cell is highly sought after. For this, nanocluster based electrodes and/or alloying Pt with other transition metals appeared to be a promising approach for improving the efficiency and stability of the catalyst. Such alloying with other metals leads to the formation of bimetallic catalysts like Pt skeleton, Pt skin, mixed alloy, and core-shell structures. Among them, core-shell-based catalysts are very promising due to the easy tunability of the inside core and the presence of resistant shell layers for sustaining the harsh reaction conditions of fuel cells. These aspects about fuel cells were presented in the talk.

3. Plutonium: a unique element: *Dr. P. R. Vasudeva Rao, Raja Ramanna Fellow, Department of Atomic Energy, Former Director, IGCAR, Kalpakkam, Dec 06, 2016.*

The talk presented important aspects of Plutonium in lucid and clear manner. Plutonium, more specifically the important isotope Pu-239, was isolated and identified in February 1941, exactly 75 years ago. The discovery of Pu has made a great impact on mankind, in more ways than one. The common man remembers Pu as a dangerous and toxic element used in nuclear weapons. Those who belong to nuclear fraternity, however, recognize it is an element with unique and interesting properties, and an element with great potential to provide clean energy. For India, Pu is the central element of its nuclear power strategy, enabling India to utilize its modest resources of uranium in a most effective manner. The presentation provided an account of the discovery of Pu and developments related to its production and utilization. The presentation covered the place of Pu in Indian Nuclear Programme in a pedagogical way.

4. Future directions in X-ray Optics at Diamond: *Dr. K. J. S. Sawhney., Head, Optics and Metrology Group, and Principal Beamline scientist, B-16 test beamline at Diamond Light Source, UK, Dec 07, 2016.*

Diamond Light Source is a third generation 3 GeV synchrotron radiation facility with thirty beamlines in user operation. Diamond is completing ten years of successful user operation this month and looking ahead Diamond has prepared a 10-year vision for the future upgrade of Diamond machine and the beamlines. Even more challenging beamline optics and metrology would be required to match the enhanced synchrotron source. In this talk, future directions in X-ray optics and metrology at Diamond were presented.

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