

Seminar

Institute for Plasma Research

Title : Study of Clusters using Mass Spectrometry, Optical Spectroscopy and Imaging technique

Speaker : Dr. Arvind Kumar Saxena

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Date : 05th August 2016 (Friday)

Time : 10.30 AM

Venue : Seminar Hall, IPR

Abstract:

Neutral and ionic clusters play an important role in many branches of science, such as, Atmospheric science, Space science, Material science, Surface science, Nano-technology, Astrochemistry, Astroplasma etc. These species present in the atmosphere have a vital role for gas phase chemical reactions. The interaction between a cluster and molecules may lead to the formation of a mixed cluster following the adsorption process, and a chemical reaction may occur between these molecules adsorbed onto the surface of a cluster in the presence of radiation. Such reactions affect our climate and their investigation is crucial to understand the atmospheric processes at atomic and molecular level.

Apart from the tremendous demand in fundamental and basic science research, clusters have increasing applications in technologies, such as, in controlling of surface properties, fabrication of micro structures on solid surfaces, miniaturizing components for modern day electronic industry. They are popularly used for preparing new classes of materials with enhanced optical, magnetic, and chemical properties. Clusters are used as an ideal catalyst in chemical industry. Thus information obtained from cluster properties and behaviour benefits wide community of basic science and applied research.

The primary requirement for studying atomic and molecular clusters is the development of a cluster source to generate a beam of neutral clusters. For generating a cluster beam from solid as well as from gas target, techniques of plasma ion sputtering, laser ablated plasma plume and supersonic expansion of gas are employed. Clusters are diagnosed by optical emission spectroscopy, time-of-flight mass spectrometry and velocity map imaging technique. In this talk, importance of gas phase cluster science, cluster sources developed in-house (for generating a beam of neutral clusters using different techniques, such as, plasma ion sputtering, laser ablation of solid target and supersonic expansion of gas), and their diagnostic techniques will be discussed. The interesting results obtained from the diagnostics of clusters will also be discussed in detail.
