

Seminar

Institute for Plasma Research

Title : Study of atomic and molecular clusters generated by laser ablation source

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Date : 11th September 2017 (Monday)

Time : 11.00 AM

Venue : Seminar Hall, IPR

Abstract :

Atomic and molecular 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. Neutral and ionic clusters present in the atmosphere have a vital role for gas phase chemical reactions. 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, chemical and photocatalytic properties. Clusters are also 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. In order to investigate the dynamics of clusters exposed to intense pulsed laser, our primary requirement is the development of a cluster source. We are developing a cluster source based on laser ablation of solid target accompanied by a supersonic gas expansion. The beam of neutral clusters, thus generated, will be exposed to a pulsed laser beam leading to the production of cluster ions formed by multiPhoton ionization. The ions will be detected by a home built Time-Of-Flight (TOF) mass spectrometer. In the present talk, design and development status of laser ablation cluster source and TOF mass spectrometer will be discussed in detail. Apart from the mass spectrometric studies, optical emission spectroscopy is employed for investigating the optimum conditions of carbon cluster production in laser ablated seed plasma and colliding plasmas under an ambient gas. In particular, significant characteristic differences in the formation of carbon clusters in a seed plasma and in the stagnation layer of colliding plasmas under gas ambient will also be discussed in detail.
