

Seminar

Institute for Plasma Research

Title: Relative abundance of elements in geological material using Spectroscopic Techniques

Speaker: Dr. Vineet Kumar Shukla
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Date: 05th July 2024 (Friday)

Time: 02:00 PM

Venue: Seminar Hall, IPR

Abstract

Laser-induced breakdown Spectroscopy (LIBS) is a trendy technique. LIBS can obtain multi-elemental analysis in a single laser shot, a very small amount of material ($\sim 1\mu\text{g}$) or volume is required, and used for in-situ analysis. Due to its unique properties, LIBS is a potential tool for in-situ real-time analysis of plants, bio, and nuclear material etc. LIBS technique has been used to analyze the sedimentary rocks (sand, soil). In this talk, we have demonstrated the ability of the LIBS technique for quick detection and quantification of rare earth elements (REEs) and radioactive elements in sedimentary rocks (sand), metamorphic rocks (coal samples), Igneous rocks (stones), and river water samples.

The primary objectives of the talk are as follows:

- I. To optimize excitation sources, collection optics, and detectors to boost sensitivity and obtain refined spectra for elemental analysis of geological materials present on Earth such as various rocks (sedimentary, Igneous, and metamorphic).
 - II. Devising a theoretical model such as calibration-free-LIBS to estimate the actual concentration of the element present in the sample and understand the detection limits.
 - III. Utilizing multivariate analysis on the proposed samples to discern distinct characteristics among different varieties, facilitates the creation of a model for characterizing unknown samples.
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