

Seminar

Institute for Plasma Research

Title: Two dimensional elemental mapping by laser induced breakdown spectroscopy: Methodology and quantitative analysis of complex geological and metallic samples
Speaker: Dr. Vineet Kumar Shukla
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Date: 23rd July 2025 (Wednesday)
Time: 10:30 AM
Venue: Seminar Hall, IPR

Abstract

Spatially resolved LIBS imaging is rapidly growing as an alternate tool for chemical/ elemental mapping of the sample surface, especially in geological sample where the knowledge of spatial variation and overall distributions of constituent's elements are important. Cost effective, fast and its ability to detect almost all elements gives as an advantage over other mapping techniques. In this regard an experimental setup is designed and developed for surface mapping of the target sample. This is based on the generation of laser induced plasma at different location of the considered surface area. Spectral emission from the plasma at each locations are analyzed to create a two dimensional elemental map of the sample. In the developed setup, programmable translator system, laser pulse and spectrometer are mutually synchronized for required sequence of data acquisition. Two geological sample (sand rock) are analyzed with 100 micrometer spatial resolution and randomly selected 4x4 mm² surface area. The present results demonstrate the distributions and abundance of constituent's elements, e.g. Ca, Na, K, Mg, Fe, Al and Si in clear visual form. Further, segregation of industrial steel in terms of its hardness and compositions by spectroscopic method are also discussed. Importance of statistical analysis, for example, principle component analysis and clustering methods in these studies are also highlighted.
