

ICFDT7 - 7th International Conference on Frontier in Diagnostic Technologies



Contribution ID: 87

Type: **Tutorial**

Recent advances and future perspectives in LIBS for industry and environment

Monday, 21 October 2024 12:40 (30 minutes)

Laser-induced plasmas are versatile physical systems with applications in a wide range of fields, spanning from materials and biomedical sciences to environmental and food safety to extraterrestrial planet exploration, and more. Making the most of this broad set of applications requires a detailed knowledge of the plasma parameters and elementary processes responsible for the generation and time evolution of the plasma itself.

Laser-Induced Breakdown Spectroscopy (LIBS) is a powerful means to this end, providing both fundamental insight into laser-induced plasmas and a practical approach to obtain qualitative and quantitative elemental analysis of a vast variety of samples.

This tutorial talk will cover the fundamentals of LIBS, from both the theoretical and the practical point of view, as well as review various experimental approaches to tailor the technique and maximize its analytical performance.

These aspects will be discussed within the frame of two of the most promising and mature fields of application of LIBS as an analytical technique, i.e., industrial monitoring and environmental sciences, and particular emphasis will be given to an overview of key advances in areas of strategic importance such as pharmacology, mining, metallurgy, and waste recovery and recycling.

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Session Classification: Industrial and Cold Plasmas

Track Classification: Industrial and Cold Plasmas