

Nanoparticle-Enhanced Laser Induced Breakdown Spectroscopy

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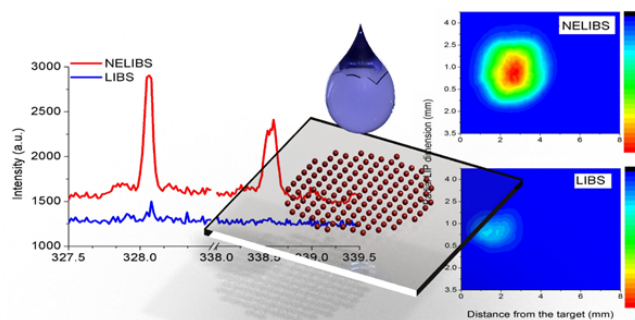
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During last decades, plasmonic systems based on metallic nanoparticles (NPs) have been largely employed for analytical spectroscopy since they can help to reach an extremely high sensitivity and very low limits of detection. Nanoparticle Enhanced Laser Induced Breakdown Spectroscopy (NELIBS) has been successfully employed for enhancing the emission signal obtained with Laser Induced Breakdown Spectroscopy (LIBS), in order to reach LOD down to ppb level [1]. The main mechanism of signal enhancement occurring during the NELIBS has been recently reported in Ref. [2] and it is based on the coupling of the NP plasmonic system with the ablated matter at the initial stage and the electromagnetic field of the incoming laser pulse. NELIBS has been applied to several applications spacing from elemental analysis of metal alloys [1], biological fluids and tissues [3] as well as to precious sample that need to be preserved from laser sampling [4]. Finally NELIBS has also shown to be used a sensor for protein-NP conjugates [6].



In this lecture starting from fundamental aspects some important applications will be shown as examples and the comparison of NELIBS with traditional LIBS will be discussed on the basis of experimental observations.

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- [2] De Giacomo, A., Alrifai, R., Gardette, V., Salajková, Z., Dell'Aglio, M., (2020) *Spectrochim. Acta B*, 105794.
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- [5] Dell'Aglio, M., Salajková, Z., Mallardi, A., Sportelli, M.C., Kaiser, J., Cioffi, N., De Giacomo, A., (2021) *Talanta*, 235, 122741.