Contribution ID: **89** Type: **not specified**

Reverse X-ray Photoemission Spectroscopy with LIXS

Monday, 19 June 2023 16:30 (30 minutes)

Laser ablation (LA) is a spatially resolved technique enabling fast sampling of any kind of matrix without sample preparation. The ability to measure important elements such as H, C, N, O or Li, Be, B, F, P, Cl, makes laser-induced breakdown spectroscopy (LIBS) complementary to established laboratory techniques such as X-ray Fluorescence spectroscopy (XRF). While poorer on the target analysis, LIBS offers a substantial potential for non-target qualitative analysis, if precision and specificity would improve consistency. Furthermore, although LIBS has the unique advantage to be operable in situ, i.e. in the field and/or in a low-pressure environment for space exploration, its susceptibility to the conditions limits its impact for heterogeneous materials.
Laser-Induced XUV Spectroscopy (LIXS) is similar to LIBS, but at a much shorter wavelength domain, the soft X-ray (10-100 nm). LIXS happens when the early laser-plasma is extremely hot and dense, giving selective prevalence to ion lines. These make the spectrum cleaner, stable and intense, with modest noise. The generation of a LIXS spectrum requires a high-fluence laser pulse, and a vacuum spectrometer for the short wavelength. The degraded resolving power at shorter wavelengths makes it generally difficult to collect a non-distorted (stigmatic) spectrum below 100 nm. We have addressed this technical challenge. The application of LIXS to characterize the heterogeneity of energy and valuable materials is discussed. The signal produced by radiative electron recombination may be used to obtain chemical information, similarly as done in X-ray photoelectron spectroscopy.

Summary

Primary author: BLEINER, Davide

Presenter: BLEINER, Davide

Session Classification: X-ray applications in various fields