

Laser Induced XUV Spectroscopy for Oxidation Fingerprinting of Functional Materials

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Direct solid microanalysis via laser microsampling offers key benefits: (i) flexibility across various matrices, (ii) minimal sample preparation, and (iii) high spatial resolution down to the diffraction limit, with ppm-level detection. Established techniques, such as Laser-Induced Breakdown Spectroscopy (LIBS) and Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS), have proven effective but face challenges in fingerprinting of material stoichiometry. Our group has pioneered an innovative solution using extreme ultraviolet (XUV) detection for LIBS. Laser-Induced XUV Spectroscopy (LIXS) resolves the XUV emissions from laser plasma, improving detection of low-Z elements and matrix independence. Further, we recently shown how it can extract information on the oxidation of materials. The basic idea is that the oxidation select the unoccupied shells, while electronic recombination in the laser-produced plasma maps these unoccupied shells. Crucial is the role of the detector, especially to expand the bandwidth and sensitivity.

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