

Abstract Submitted
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Nanoscale volumetric chemical imaging by soft x-ray laser ablation mass spectrometry¹ ILYA KUZNETSOV, JORGE FILEVICH, MARK WOOLSTON, GERALD GASPER, Colorado State University, DAVID CARLTON, WEILUN CHAO, ERIK ANDERSON, Lawrence Berkeley National Laboratory, ELLIOT BERNSTEIN, DEAN CRICK, JORGE ROCCA, CARMEN MENONI, Colorado State University — Mass Spectrometry Imaging (MSI) has played an important role in the direct examination of the chemical composition of complex inorganic and organic samples. Typically a visible/ultraviolet laser is used to ablate the sample and create ions that when detected enables the identification of molecular composition. We report the use of soft x-ray (SXR) lasers in the implementation of a novel laser ablation mass spectrometry (XLAMS) nanoprobe that can probe chemical composition from sample regions of a few attoliters volume and with high sensitivity. The concept exploits: i) high focusability, ii) low penetration depth and iii) high photo-ionization efficiency of the 46.9 nm wavelength SXR laser light. In this work we demonstrate the capabilities of XLAMS to realize chemical contrast imaging with ~ 140 nm lateral and ~ 50 nm depth resolution and high sensitivity. The high lateral and depth resolution and high sensitivity of XLAMS imaging method offer great potential for composition imaging of nanofilms and nanostructures and imaging the chemical distribution of dopants and trace elements.

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