

FEMTOSECOND ELEMENT-SPECIFIC XUV SPECTROSCOPY OF COMPLEX MOLECULES AND MATERIALS

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Systems with multiple heavy atoms, such as the multimetallic clusters favored by Nature for redox catalysis and emerging photovoltaic materials such as $\text{CH}_3\text{NH}_3\text{PbI}_3$, pose challenges for traditional spectroscopic techniques. The growing field of high-harmonic extreme ultraviolet spectroscopy combines the element-, oxidation state-, spin state-, and ligand field specificity of XANES spectroscopy with the femtosecond time resolution of tabletop Ti:Sapphire lasers. We will show that this technique can be used to measure the photophysics of transition metal complexes, organohalide perovskites, and even small metalloproteins, extending the technique to mainstream problems in physical and inorganic chemistry.