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Femtosecond XUV transient absorption spectroscopy of small organic molecules FLORIAN LACKNER, ADAM S. CHATTERLEY, DANIEL M. NEUMARK, STEPHEN R. LEONE, OLIVER GESSNER, Lawrence Berkeley National Laboratory — High-order harmonic generation has evolved as a powerful method for the generation of femtosecond XUV pulses with table-top laser systems. Femtosecond XUV transient absorption spectroscopy is an emerging application of these novel light sources for the investigation of molecular dynamics. Recording time-dependent XUV induced core-to-valence transitions traces a molecular response to an initial perturbation with IR, VIS or UV laser pulses from the perspective of distinct atomic sites. Preliminary results for sulfur and selenium containing organic molecules, such as thiophene (C_4H_4S) and selenophene (C_4H_4Se), are presented. While molecular orbital dynamics in thiophene will be monitored at the sulfur 2p edge around 165 eV, experiments at the Se 3d (57 eV) and Se 3p (163 eV) edges of selenophene will provide insight about the impact of specific inner-shell transitions within the same atom on the spectroscopic fingerprint of similar dynamics. The method's element-specificity and sensitivity to local valance electronic structures will be exploited to monitor the photo-induced opening of the aromatic rings at the S-C and Se-C bonds, thereby shining new light on the primary steps of photochemical reaction pathways in organic compounds.

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