

Abstract Submitted
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Real-time Dynamics of Surface Photoreactions Probed with Ultrashort XUV Pulses¹ XINLONG LI, PENG ZHAO, CHRISTOPHER CORDER, AUSTIN POLANCO, MELANIE REBER, YUNING CHEN, Department of Physics and Astronomy, Stony Brook University, NY Department of Chemistry, Stony Brook University, NY, AMANDA MURACA, MATTHEW KERSHIS, MICHAEL WHITE, Chemistry Department, Brookhaven National Laboratory, NY Department of Chemistry, Stony Brook University, NY, THOMAS ALLISON, Department of Physics and Astronomy, Stony Brook University, NY Department of Chemistry, Stony Brook University, NY — High harmonic generation (HHG) and time-resolved photoelectron spectroscopy (TRPES) are well-established techniques, broadly applicable for studying electronic and nuclear dynamics in real time. However, conventional HHG is typically limited to low repetition rates (<100 kHz), hindering its applications. In our lab, we use cavity enhanced HHG to produce high repetition-rate (80 MHz) XUV (~ 40 eV) pulses. We make use of Yb-fiber-based two-stage chirped pulse amplification, producing NIR pulses with 80 MHz repetition rate, 150 fs duration and 70 W average power. In the subsequent enhancement cavity, pulses are coherently added and stored, leading to an intensity that is hundreds of times higher to achieve HHG with Argon gas. For surface experiments, this can help us keep the per-pulse fluence low to avoid space charge effects. Our specific goal is uncovering the dynamics of the photoreactions on surfaces, focusing on bare titania (TiO_2) and titania surfaces which contain noble metal nanoparticles.

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