W0096

Ultrafast Electron Diffraction for Interfaces and Nanometer Scale Materials. C.-Y. Ruan, Dept. of Physics and Astronomy, Michigan State Univ., East Lansing, MI 48824 USA.

Surfaces are omnipresent in all condensed matter systems and are essential in many fundamental processes in material science and biology. Atomic surfaces can be modified with layered structures to engineer tailor-made properties for nanometer scale sensing and electronics, or be used as templates for monolayer-assemblies with control from surface chemistry. Ultrafast electron diffraction (UED) and energy loss spectroscopy (UEELS) can be applied to resolve, for these materials, both structures and dynamics to elucidate the underlying mechanisms and functions. I will outline the recent development of surface UED in which crystalline substrates were used as templates for making chemically modified layers or supramolecular assemblies; their local structures and periodic orders in the long range reflect their affinities to the substrates. With controls of laser fluence, energy, and surface character, strongly driven (either from charge or from thermal strain) restructuring of the surfaces and adspecies were observed with sub-angstrom displacement of atoms following the ultrashort laser impulse in the far-from-equilibrium regime at short time and at near-equilibrium at long times.