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In situ coherent x-ray scattering and STM studies of hexagonally reconstructed Au(001) in Electrolytes[1] MICHAEL S. PIERCE, Materials Science Division, Argonne National Laboratory, VLADIMIR KOMANICKY, Faculty of Science, Safarik University, ANDI BARBOUR, DANIEL HENNESSY, Materials Science Division, Argonne National Laboratory, JUN-DAR SU, ALEC SANDY, Advanced Photon Source, Argonne National Laboratory, HOYDOO YOU, Materials Science Division, Argonne National Laboratory — We have studied the dynamics of Au(001) and Au(111) surfaces in situ in 0.1 M HClO4 electrolyte solution using coherent x-ray scattering experiments and STM microscopy. Our coherent x-ray scattering experiments measure a correlation time for the surface as a function of applied potentials. Coherent x-ray scattering differs from the ordinary x-ray diffraction in sensitivity to the structural and temporal details. The correlation times were obtained from measurements conducted while the surface is in equilibrium and the ordinary surface scattering intensity is constant. The correlation time changes from high 10^3 seconds to low 10^2 seconds. The correlation times of reconstructed surfaces at low potential are at least an order of magnitude smaller than those measured at the reconstructed surfaces in vacuum. The correlation times also change dramatically in response to the applied potential. These experiments also represent the first successful application of coherent x-ray scattering to the study of electrochemical interfaces in situ.

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