

Abstract Submitted
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Probing the Fluid-Graphene Interface for Electrochemical Storage by *in-situ* Synchrotron X-ray Scattering HUA ZHOU, PAUL FENTER, Argonne National Laboratory, JAKE MCDONOUGH, VOLKER PRESSER, YURI GOGOTSI, Drexel University, PASQUALE FULVIO, SHENG DAI, Oak Ridge National Laboratory — The interactions of electrolyte fluids with solids control many complex interfacial processes encountered in electrochemical energy storage systems. In this talk, we will demonstrate how to develop a fundamental atomic-scale understanding of interfacial structures and processes at the electrolyte-graphene interface. We have performed systematic measurements of high resolution X-ray reflectivity from epitaxial graphene films in contact with electrolytes including aqueous solutions and room temperature ionic liquids. The electron density profiles and structural models from the fully analyzed data reveal the intrinsic interfacial structures of these systems. Moreover, we have developed successfully a customized electrochemical sample cell that allows the solvent reorientation and ion adsorption measurements to be done *in-situ* with control of the surface potential. Specular Bragg rod and resonant anomalous X-ray reflectivity measurements were performed in combination with electrochemical characterizations. The combination of *in-situ* structural measurements with electrochemical controls will lead to fundamentally new insights and provide unique tests of atomistic fluid-solid interface models for energy storage systems.

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