

Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

The wetting behavior of electrolytes at charged carbon electrode materials probed using neutron scattering¹ JOSE LEO BAÑUELOS, PASQUALE FULVIO, GERNOT ROTHER, LAWRENCE ANOVITZ, JIM BROWNING, Oak Ridge National Laboratory — Breakthroughs in the performance of energy storage technologies come from efficient combinations of novel electrolytes and electrode materials. Knowledge of the structure of these materials under applied electric fields is necessary to better tailor them to our energy needs. Neutron scattering, as a structural probe to investigate the ordering of electrolytes at an interface, or the effects of confinement on an electrolyte in a nanoporous matrix, is well suited since the electrolytes commonly used contain hydrogen and the host matrix can often contain active sites that are difficult to discern without the use of contrast matching via isotopic substitution. We present small angle neutron scattering results, conducted at the EQ-SANS (ORNL) instrument and at the Low-Q Diffractometer (LANL), from in situ electrochemical measurements of a deuterated ionic liquid, and of aqueous electrolytes, in a mesoporous carbon membrane at different applied potentials over time. Recent neutron reflectometry measurements (LR, SNS) complement the observed behavior from SANS. We observe a higher electrolyte density near the electrode material surface, compared to without an applied potential. Furthermore, this high density region persists long after the applied potential is removed.

¹This work supported by the U.S. DOE, BES, as part of an Energy Frontier Research Center. Neutron scattering was conducted at the Lujan Neutron Scattering Center and Spallation Neutron Source, sponsored by the Div. of Sci. User Facilities, U.S. DOE.

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Date submitted: 09 Dec 2011

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