

Abstract Submitted
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Structure of Nafion Thin Films on Gold¹ ADAM WEBER, AHMET KUSOGLU, ALEXANDER HEXEMER, Lawrence Berkeley National Laboratory — Nafion is the prototypical ionomer in electrochemical energy devices due to its good ionic conductivity and permselectivity. In most devices, ionomers are in contact with precious metal catalysts. When confined to nanometer-thick “thin” films (10 to 100 nm), Nafion’s morphology and associated transport properties deviate from the bulk. These changes are a function of the substrate and film thickness. In this talk, results from a systematic study of Nafion thin-film morphology on gold substrate using Grazing-incidence X-Ray Scattering (GISAXS) will be presented. GISAXS experiments carried out for a range of incident angles combined with the simulations of the electron density are used to demonstrate that the collected patterns are real and show an anisotropic long-range structural order that is strongest when the film thickness is around 50 nm and weakens for thicker and thinner films. Such ordering is not readily discernible on other substrates like carbon, nor with non-phase separated polymers like polystyrene. Results presented herein provide new insights into the key role of substrate/film interactions in inducing ordered structure in Nafion, which has implications for understanding ionomers interacting with various organic and inorganic materials in electrochemical devices.

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Adam Weber
Lawrence Berkeley National Laboratory

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