

Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Influence of Substrate on PFSA Thin-Film Morphology PETER DUDENAS, UC Berkeley, AHMET KUSOGLU, SINGANALLUR VENKATAKRISHNAN, ALEXANDER HEXEMER, ADAM WEBER, Lawrence Berkeley Natl Lab — Perfluorosulfonic-acid (PFSA) ionomers are the most commonly used electrolyte for polymer-electrolyte fuel cells (PEFCs) due to their high conductivity and good electrochemical and thermo-mechanical stability. A PFSA's chemical structure is comprised of a polytetrafluoroethylene (PTFE) backbone that provides mechanical and chemical stability, and randomly placed tethered perfluoroether side chains terminated with sulfonic-acid groups, which impart its remarkable proton-conduction capabilities. Controlled by substrate/film interactions, long-range structural order in PFSA's change when confined to thin films (<200 nm), as does its transport and mechanical properties. The nature of change is substrate dependent, where stronger interactions create a more dramatic change in properties. In this talk, grazing-incidence c-Ray scattering (GIXS) is used to demonstrate induced structural order on metallic substrates, which is not present on other substrates like silicon and carbon. The higher degree of ordering is correlated with measured changes in mechanical properties for the thin films. Scattering data is also modeled using the recently released program high-performance GISAXS (HipGISAXS), to estimate the size and distribution of the ordered domains. -/a

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Date submitted: 02 Dec 2015

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