

Abstract Submitted  
for the MAR09 Meeting of  
The American Physical Society

**Multi-Lamellar Structures in Nafion** JOSEPH A. DURA, NIST - Center for Neutron Research, VIVEK S. MURTHI, UTC Power Corp., MICHAEL R. HARTMAN, University of Michigan, Nuclear Engineering and Radiological Sciences, SUSHIL K. SATIJA, CHARLES F. MAJKRZAK, NIST - Center for Neutron Research — Both proton conductivity and gas diffusion are key factors in the performance of a fuel cell proton exchange membrane, PEM. They are critically dependent on water content and morphology, especially in the three phase region where catalyst, PEM, and gases such as fuel or oxidizer co-exist. Here we show that lamellar structures composed of thin alternating water rich and Nafion rich layers exist at the interface between  $\text{SiO}_2$  and the hydrated Nafion film. Lamellae thickness and number of layers increase with humidity. Some lamellae remained in the film after dehydration. Multilayer lamellae are not observed for Nafion on Au or Pt surfaces. Instead, a thin partially hydrated single interfacial layer occurs and decreases in thickness to a few angstroms as humidity is reduced to zero. The absorption isotherm of the rest of the Nafion film is similar to that of bulk Nafion for all three surfaces investigated.

Joseph A. Dura  
NIST - Center for Neutron Research

Date submitted: 10 Dec 2008

Electronic form version 1.4