Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Proton-Conducting Metal-Organic Frameworks JAMIE FORD, University of Pennsylvania, JASON SIMMONS, NIST Center for Neutron Research, TANER YILDIRIM, NIST Center for Neutron Research, University of Pennsylvania — Vehicles powered by polymer electrolyte membrane (PEM) fuel cells are an exciting alternative to current fossil fuel technology. The membranes in these cells serve as both charge transporter, ferrying protons from the anode to the cathode, and gas diffusion barrier, preventing the backflow of oxygen to the anode. Currently, hydrated sulfonated polymers are the preferred material for these membranes. The presence of water, however, limits the operating temperature to 100 C, reducing the electrode kinetics and CO tolerance of the entire system. In an effort to increase the efficiency and operating temperature of these fuel cells, we are investigating the proton conductivity of new host/guest materials based on metal-organic frameworks (MOFs) loaded with imidazole. These thermally stable frameworks provide well-defined pores that accommodate imidazole networks and form proton-conducting pathways. Here, we will present the structure and proton dynamics of these materials as elucidated by elastic and inelastic neutron scattering measurements.

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Date submitted: 20 Nov 2009 Electronic form version 1.4