Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Characterization of Hybrid Polyhedral Oligomeric Silsesquioxane (POSS)-Polybenzimidazole (PBI)-Phosphoric Acid (PA) Materials Intended for Proton Exchange Membranes (PEM) ROBERT BUBECK, EDMUND STARK, Michigan Molecular Institute, BERRYINNE DECKER, Chemsultants International, CLAIRE HARTMANN-THOMPSON, Michigan Molecular Institute — Isophthalic acid and 3,3'-diaminobenzidine (DAB) were polymerized in the presence of polyphosphoric acid (PPA) and various additives, degree of polymerization was monitored by viscosity and torque change measurements, and membranes were prepared by casting the reaction solution and allowing PPA to hydrolyze to PA under ambient conditions. As a function of relative humidity, the membranes were characterized for (1) acid content, (2) in-plane conductivity and (3) complex shear modulus G* obtained via oscillatory parallel plate dynamic mechanical spectroscopy. The addition of sulfonated octaphenyl polyhedral oligomeric silsesquixane (S-POSS) to *m*-polybenzimidazole (PBI)-phosphoric acid (PA) membranes resulted in increased in-plane proton conductivity at high temperatures (120-150 °C) and increased G* relative to a *m*-PBI control membrane and to *m*-PBI control membranes carrying comparable weight loadings of non-proton conducting octaphenyl-POSS nanoadditive or silica.

Robert Bubeck
Michigan Molecular Institute

Date submitted: 25 Oct 2012 Electronic form version 1.4