

Modeling of Electrochemical Cells:
Proton Exchange Membrane Fuel Cells
HYD7007 – 01
Yonsei University

Homework Assignment 03
Spring, 2011

1. In the comparison of the SSC PFSA and Nafion, we discovered that the mechanical properties might be responsible for the superior performance of SSC at low water contents. Like the transport properties, mechanical properties have their origins in the nanostructure of the membrane. How might the nanostructure of SSC PFSA provide a more resilient membrane, relative to Nafion?
2. The inclusion of inorganic nanoparticles in PEM composite membranes shows a maximum in conductivity as a function of the weight fraction of nanoparticle? What are the two competing forces that give rise to the maximum?
3. Researchers have examined many different membrane, varying polymer, solvent and composite content. Go to the literature and find a paper examining a membrane not discussed in the lecture notes. Report the performance. Compare the performance to Nafion. Is it superior at any water content or temperature range? Provide complete citation information for the source.