

Polymer Blend R&D and PEM Preparation  
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Proton exchange membranes require high proton conductivity at low water concentrations, low gas permeability and good mechanical properties. Homogeneous polymer electrolytes such as Nafion have difficulty offering these antagonistic properties simultaneously. The concept of the project is to use two polymeric components, one of which is highly proton conducting while the other is temperature and creep resistant. The research has focused thus far on near-critical polymer blends and the use of electric fields to control the size and morphology of the highly interconnected biphasic structures resulting from the phase decomposition of these blends. We have studied a model blend of poly(2,6 dimethyl phenylene oxide) and sulfonated polystyrene, as well as a more practical blend of sulfonated poly (ether ketone ketone) (SPEKK) and a thermoplastic polyether imide. Membranes with conductivities approaching Nafion have been fabricated.