

Abstract Submitted
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Developments of Novel Polymer Electrolyte Fuel Cell Membranes¹ TOMOMI IRITA, Polymer Science & Engr. Dept. UMass, MASAHIRO KONDO, HIROKAZU AOYAMA, Fundamental Research Dept., Chemical Div. Daikin Industries, Ltd Osaka, THOMAS RUSSELL, Polymer Science & Engr. Dept. UMass — Perfluorinated polymer electrolyte membranes (PEM), such as Nafion, are considered to be the most promising candidate for the development of the next generation fuel cell technology. The key technological challenges facing PEMs are their performance, durability and cost. In this research, the polymer electrolyte emulsions (PEE) were obtained by a simple hydrolysis reaction of the precursor polymer emulsion. PEMs are obtained by solvent casting the PEE. The PEE obtained here has a very low viscosity even at high solution concentrations. Using high concentration emulsions greatly reduces the amount of the waste, which makes this technology superior to the conventional ones. Casting conditions were optimized to enhance the mechanical properties, e.g. the tensile strength and viscoelastic properties, of the membrane. The PEMs obtained possessed better ionic conductivity than Nafion while their mechanical properties are comparable. Finally, the cost evaluation for this process was conducted and it was shown that the contribution to the cost reduction becomes bigger. (This research was sponsored by New Energy and Industrial Technology Development Organization, Japan)

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