

Proton Conductivity of Solid Polymer Electrolyte Membranes

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The solid polymer electrolyte membrane (PEM) plays a vital role in proton exchange membrane fuel cells. It acts as both a medium for proton conduction from anode to cathode as well as a separator to prevent the mixing of reactant gases. An A.C. impedance technique has been developed in our lab to measure proton conductivity of various membranes under conditions of controlled temperature and humidity to study the factors that affect proton conductivity.

This technique uses a gold plated coaxial probe similar to the one developed by Gardner and Anantaraman¹ which allows measurement of proton conductivity without subjecting the membrane samples to the high temperature conditions associated with a gold evaporation process. Using this technique has the advantage that access to only one side of the membrane is necessary, making it easy to control physical parameters such as temperature and humidity.

Results correlating proton conductivity to ion exchange capacity, temperature and humidity will be presented.

References

- 1) Gardner, C.L.; Anantaraman, A.V.
J.Electroanal.Chem. **1995**, 395, 67-73.