

# UNH Materials Science Seminar

11:00-12:00, Thursday, September 16, 2004

DeMeritt Hall 209B

University of New Hampshire

## New Materials for Proton Exchange Membranes

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Polymeric proton exchange membranes (PEM) are a critical component in hydrogen and direct methanol fuel cells. The PEM serves as the electrolyte for facilitating proton transport from the anode to the cathode and as a separator preventing mixing of the fuel and oxygen from the cathode side of the cell. The most common commercial PEM material is Nafion<sup>®</sup>, which is a perfluorosulfonic acid ionomer produced by Du Pont. Although Nafion<sup>®</sup> has been used in fuel cells for some 30 years, it has several deficiencies, namely an upper use temperature of about 80°C, poor wet strength, poor conductivity at low relative humidity and poor resistance to fuel transport, that limit its usefulness for the next generation of fuel cells. In this talk, we will discuss alternative material design strategies for developing new PEMs for fuel cells. This includes the synthesis of aromatic hydrocarbon-based ionomers, blends of an ionomer with a non-conductive polymer and composites. In addition, we will discuss opportunities for novel processing strategies that may provide unique polymeric microstructures that are advantageous for PEMs.