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Water Retention and Proton Conductivity of Block Copolymers in Contact with Humid Air[1]

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Membranes composed of diblock copolymers with a hydrophilic and a hydrophobic block were contacted with humid air. We are particularly interested in the properties of membranes with hydrophilic phases with characteristic sizes in the 2-5 nm range. These membranes get wetter as the surrounding air gets hotter at constant relative humidity. Changes in the proton conductivity of the membrane and partitioning of water between and the air and the membrane were recorded after step changes in the air temperature at constant relative humidity. We find surprising differences between symmetric and asymmetric block copolymers. In particular, the conductivity of asymmetric block copolymers evolves mush more slowly than water concentration. *In-situ* small angle neutron scattering measurements were used to understand the origin of this behavior.

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