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Confinement Effects on Watery Domains in Hydrated Block Copolymer Electrolyte Membranes MOON JEONG PARK, Department of Chemistry, Pohang University of Science and Technology, SUNG YEON KIM, JOOMI YEO — The morphology of a series of diblock copolymers comprising randomly sulfonated polystyrene (PSS) and polymethylbutylene (PMB) blocks equilibrated with humid air was determined by in-situ small angle neutron scattering (SANS). In-situ SANS data were collected over a wide angular range permitting the determination of the superstructure of the hydrophilic PSS-rich and hydrophobic PMB-rich domains and the substructure within the hydrophilic PSS-rich domains. When the characteristic length of the superstructure is larger than 10 nm, the hydrophilic PSS domains are heterogeneous with periodically arranged watery domains. The scattering signature of the watery domains is very similar to the well-established “ionomer peak.” This peak vanishes when the neutron scattering length density of the water (H₂O/D₂O mixture) is matched to that of the PSS block. The spacing between watery domains depends only on sulfonation level of the PSS block. When the characteristic length of the superstructure is less than 10 nm, the watery substructure disappears and homogeneous hydrated PSS-rich domains are obtained.

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