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Structure-Property Relationships in Sulfonated Pentablock Copolymers JAE-HONG CHOI, Department of Materials Science and Engineering, University of Pennsylvania, CARL WILLIS, Kraton Polymers LLC, KAREN I. WINEY, Department of Materials Science and Engineering, University of Pennsylvania — Membranes of pentablock copolymers consisting of poly(*tert*-butyl styrene) (TBS), hydrogenated polyisoprene (HI), and partially sulfonated poly(styrene-*ran*-styrene sulfonate) (SS) were studied using small angle X-ray scattering (SAXS) and transmission electron microscopy (TEM). The TBS-HI-SS-HI-TBS pentablock copolymer in solution forms spherical micelles with a core of SS and a corona of solvated HI and TBS. The spherical micelles in solution compact as the solvent evaporates and some of SS cores merge to form interconnected SS microdomains without substantially changing their shape. The number of connections increases with the volume fraction of the SS block, which increases with sulfonation level. The structure does not have long-range order, because strong ionic interactions prevent extensive rearrangement. The morphologies of the sulfonated pentablock copolymers will be correlated with their transport properties.

Jae-Hong Choi
Dept of Materials Science and Engineering, University of Pennsylvania

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