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Morphology and Proton Transport in Polyimide-Polysiloxane Segmented Copolymers[1] LIJUN ZOU, MITCHELL ANTHAMATTEN, University of Rochester — Sulfonated polyimides are fuel cell candidates due to their good mechanical, chemical, and thermal stability, and their relatively high proton conductivity. Here we report the one-pot synthesis of sulfonated polyimide-polysiloxane segmented copolymers through the reaction of a dianhydride with a mixture of three diamines: a non-ionic aromatic diamine (4,4'-oxydianiline), a sulfonated diamine (4,4'-diamino-2,2'-biphenyldisulfonic acid), and a telechelic diamino polysiloxane. The presence of ionic clusters that are covalently connected to hydrophobic siloxane groups lead to interesting morphologies, swelling behavior, and proton transport characteristics. Equilibrium water sorption studies of cast films show that the presence of siloxane segments does not interfere with water swelling, suggesting microphase-segregation. TEM analysis shows evidence of phase-segregation in sulfonated polyimides and reveals that siloxane segments strongly affect ionic clustering.

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