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Dynamics and Morphology of Sulfonated Polystyrene Ionomers by Dielectric Spectroscopy ALICIA CASTAGNA, Penn State University, WENQIN WANG , KAREN I. WINEY , University of Pennsylvania, JAMES RUNT, Penn State University — The dynamics of sulfonated polystyrene (SPS) ionomers, in both the acid and neutralized forms, were investigated using broadband dielectric spectroscopy. The influences of acid content, counterion type (Zn, Na and Cs), degree of neutralization, and microphase separated morphology on segmental and local dynamics, as well as on Maxwell – Wagner – Sillars interfacial polarization, were examined. Ionomers prepared from SPS containing 1.9 mol% sulfonic acid species exhibit a broader segmental process indicative of a considerably broader distribution of local environments, as compared to those in unneutralized SPS. Moreover, multiple segmental relaxations were identified in the dielectric spectra of Zn and Na neutralized SPS (1.9 mol%) ionomers, likely indicating two distinct environments arising from ion clustering. A combination of STEM imaging and X-ray scattering confirmed the presence of monodisperse spherical ionic aggregates that were homogeneously distributed in the polymer matrix.

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