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Dynamics of Sulfonated Polystyrene Copolymers and Ionomers using Broadband Dielectric Spectroscopy PORNPEN ATORNGITJAWAT, JAMES RUNT, The Pennsylvania State University — The dynamics of sulfonated polystyrene (SPS) copolymers in acid and neutralized forms were investigated using broadband dielectric relaxation spectroscopy. SPS copolymers were synthesized by sulfonation of a monodisperse polystyrene to 1 and 7 mol %. Neutralization was achieved by exchanging the protons of the acid functionality with Na, Cs and Zn cations. Multiple relaxation processes were observed above the glass transition temperature of the neutralized and unneutralized materials. For the unneutralized copolymers, a ‘chemical relaxation’ was observed at temperatures above the segmental process, arising from the presence of hydrogen bonding. For the ionomers, a Maxwell-Wagner-Sillars process was observed due to the presence of ionic clusters. The ‘chemical relaxation’ followed Arrhenius behavior and its relaxation strength decreased significantly with increasing temperature. The relaxation times of the MWS process of all ionomers followed a VFT form. A local relaxation in the glassy state was observed for unneutralized copolymers and ionomers neutralized with monovalent cations, while it was suppressed for ionomers neutralized with divalent cations.

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