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Nanoscale Morphology of Sulfonated Polystyrene Ionomers
NANCY C. ZHOU, KAREN I. WINEY, University of Pennsylvania — We have applied our scanning transmission electron microscopy (STEM) methods to investigate the size, shape and spatial distribution of the ionic, nanoscale aggregates in poly(styrene-ran-styrene sulfonate) \( \text{P}(S-SS_x) \) ionomers. This analytical electron microscopy method minimizes phase contrast that can obscure nano-scale features and accentuates differences in atomic number. We recently reported quantitative agreement between STEM and X-ray scattering results in a Cu-neutralized poly(styrene-ran-methacrylic acid) (SMAA) ionomer with respect to the size of the ionic aggregates and their number density. For this study, \( \text{P}(S-SS_x) \) ionomers were prepared by solution neutralizing with metal acetates, solution casting, and annealing. Initial STEM results from \( \text{P}(S-SS_{0.019}) \) fully neutralized with Zn indicate a uniform distribution of monodisperse spherical aggregates. Combining direct imaging and X-ray scattering of \( \text{P}(S-SS_x) \) ionomers, we will investigate the effect of cation type and level of neutralization.