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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) (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, P(S-SS$_x$) ionomers were prepared by solution neutralizing with metal acetates, solution casting, and annealing. Initial STEM results from 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 P(S-SS$_x$) ionomers, we will investigate the effect of cation type and level of neutralization.

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