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**The influence of chain rigidity and the degree of sulfonation on the morphology of block copolymers as nano reactor** K. HONG, S. I. YUN, J. MAYS, ORNL, X. ZHANG, R. M. BRIBER, U of Maryland — Polyelectrolyte block copolymer was used to form an ordered domain of ionic block as a "nanoreactor" due to its ability to bind oppositely charged metal ion, $Zn^{2+}$, $Fe^{2+}$ etc. The purpose of our research is to investigate the controllability of the size and morphology of domains (inorganic nano particles) by changing backbone stiffness, the charge density and the volume fraction of ionic block. Poly(styrene sulfonate) (PSS), which backbone is flexible, and poly(cyclohexadiene sulfonate) (PCHDS), which backbone is "semiflexible", were used as ionic blocks. We synthesized PtBS-PSS and PS-PCHDS with various degree of sulfonation and the volume fraction. Zinc oxide (ZnO) nano particles successfully formed in the ionic domain of microphase separated block copolymers. We used SANS to characterize the morphology of block copolymers and TEM for block copolymer containing ZnO nano particles. Our experimental results show that the chemistry of "sulfonation" of block copolymers can be successfully used to synthesize nano composite materials.

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