

Abstract Submitted  
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**Interfacial Effect on Confined Crystallization of Poly(ethylene oxide)/Silica Composites.**<sup>1</sup> YUNLAN SU, WEIWEI ZHAO, Chinese Academy of Sciences (CAS), ALEJANDRO MULLER, University of the Basque Country UPV/EHU, XIA GAO, DUJIN WANG, Chinese Academy of Sciences (CAS) — In this study, the interfacial confinement effect of silica (SiO<sub>2</sub>) nanoparticles on the crystallization behavior of poly(ethylene oxide) (PEO) composites has been systematically investigated considering the size and concentration of SiO<sub>2</sub> as well as the molecular weight (Mw) of PEO in the composites. Only when Mw of PEO is higher than 1100 g/mol but lower than 35000 g/mol, do the composites with high silica loadings exhibit two crystallization peaks of PEO as determined by differential scanning calorimetry. The first peak at 0 –50 C is assigned to the crystallization of bulk PEO, while the second at –20 to –30 C is attributed to the crystallization of restricted PEO segments. Three-layer (amorphous, interfacial and bulk) model is proposed to interpret the confined crystallization of PEO/SiO<sub>2</sub> composites, which is supported by the results of thermogravimetric analysis and solid-state <sup>1</sup>H nuclear magnetic resonance. In the amorphous layer, most PEO segments are directly adsorbed on SiO<sub>2</sub> surface via hydrogen bonding, while for the interfacial layer, the conformation is closely connected with the polymer chain length, originating mainly from the inhomogeneous segment mobilities of adsorbed polymers along the direction perpendicular to the surface of silica.

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