

Abstract Submitted
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Novel Polymer Nanocomposites Resulted from Melt Processing of Polystyrene-Based Substrates Coated with Layer-by-Layer Assemblies IMAN SOLTANI, RICHARD J. SPONTAK, North Carolina State Univ — The novel polymer nanocomposites (PNCs) prepared through two steps of coating polystyrene-based substrates with layer-by-layer (LBL) deposition of montmorillonite and alternative polyelectrolyte layers of polyethyleneimine and polyethylene terephthalate ionomer, followed by their cyclic melt pressing, demonstrated particular morphologies. Transmission electron microscopy images at high magnification scales showed the occurrence of swollen intercalation and flocculated exfoliations of clay platelets, down to a few nanometer thickness, inside and sometimes out of LBL assemblies crushed portions. In fact, intercalation and exfoliation of clay platelets, established in LBL assemblies, increased by shear applied through their repetitive melt pressing. Additionally, x-ray diffractometry traces confirmed the aforementioned increase in clay intercalation. These high aspect ratio LBL assemblies portions formed highly tortuous labyrinths, which may work as scavenging centers to promote barrier properties of the PNCs against transport of gases like oxygen and carbon dioxide. It is despite spontaneously low interaction between hydrophobic styrenic groups and almost hydrophilic natural clay and moderate efficiency of cyclic pressing for providing intensive shear stress on samples.

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