

Effect of the mode of nanoclay inclusion on morphology development and rheological properties of nylon6/ethylevinyl-alcohol blend composites

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ABSTRACT:

During melt extrusion of nanocomposites, nanoparticles can be incorporated either directly or through the masterbatch, which brings up a simple question of how the mode of nanoparticle inclusion affects the morphology and hence the rheological properties of the final composite. In the study reported here, nylon6/ethyl-vinyl-alcohol (N6/EVOH) was selected to model a blend system, and the effect of the mode of organoclay inclusion on the morphology development and melt-state viscoelastic properties of ternary blend composites was investigated. The morphological study using scanning electron microscopy, transmission electron microscopy, three-dimensional tomography, and differential scanning calorimetry indicated that the intercalated silicate layers were located in the interphase region between N6 and EVOH in the N6/EVOH/masterbatch composite and core-shell particles were formed, with EVOH as the core. On the other hand, the intercalated silicate layers were well distributed in the blend matrix of the N6/EVOH/organoclay composite, and it was difficult to differentiate between two phases. Finally, the different morphological developments were correlated with the melt-state rheological properties of the composites to evaluate the processing and product performance. The results showed that the masterbatch played an important role in establishing the compatibility of N6 and EVOH, and it could impede the gel

formation that would benefit processing and product development.