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Influence of Morphology on the Mechanical Properties of Ethylene Vinyl Acetate (EVA)-clay Nanocomposites

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Ethylene-vinyl acetate copolymer (EVA)/montmorillonite (MMT) clay nanocomposites with varying degree of intercalation and exfoliation have been prepared using direct melt blending techniques with various degrees of polarity (9%, 18% & 28% VA by wt%) and two different types of clay modification. Morphological characterization using wide angle X-ray scattering (WAXS) and transmission electron microscopy (TEM) have indicated/confirmed the presence of intercalation and/or a combination of intercalation and exfoliation existing in the nanocomposites. The effects of these (simple intercalation or mixed intercalation/exfoliation) states and the effect of changing matrix polarity (by changing %VA content) on the nanocomposite mechanical behavior were studied. There is sufficient evidence from the mechanical studies that (1) the presence of nanoclay can simultaneously improve modulus and strength of the nanocomposites, and (2) the mechanical properties are a combined function of the clay concentration and the nanocomposite morphology (due to the %VA and presence of clay). It is shown that a clear understanding of the nanocomposite mechanical properties can be obtained from its morphological analysis.