

## Tuning the nano/micro-structure and properties of melt-processed ternary composites of polypropylene/ethylene vinyl acetate blend and nanoclay: The influence of kinetic and thermodynamic parameters

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### Abstract

The present study reports the dependence of the nano/micro-structure and properties of polypropylene (PP)/ethylene vinyl acetate (EVA)/nanoclay ternary composites on the kinetics and thermodynamics of the melt-mixing process. The size of dispersed EVA particles in the blends increased in the presence of the nanoclay particles, whereas in the ternary blend composites the size of the EVA dispersions decreased with increasing processing time. Intercalation and exfoliation were achieved more efficiently in ternary composites prepared with a longer EVA processing time. Moreover, the incorporation of the nanoclay particles within the EVA phase and interphase, as well as a long processing time stabilized the morphology. The degree of crystallinity, melting behavior, and crystallization temperature of PP in the ternary composites were not influenced by the presence of the nanoclay particles or by the duration of the melt-mixing process. The thermal stability of the ternary composites improved with increasing melt-mixing time. The rheological and thermomechanical properties were found to be dependent on the processing time and on the resulting structure.