



POLYMERIC NANO-COMPOSITE FORMATION VIA SOLID-STATE PROCESSING

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Solid-state processing for the preparation of polypropylene (PP)-based nano-composites having finely dispersed layered fillers was conducted. The mixture of PP and organically modified layered filler (OMLF) (95:5 wt./wt.) was subjected to the processing using alumina mortar heated 65 °C, below T_m of PP (i.e., PP is still at the solid-state), and ground for 8 h before melt compounding. On X-ray diffraction, the d(001) peak of OMLF was broaden and peak position shifted slightly. The mixture prepared by solid-state processing exhibited disorder and delaminated layer structure with the thickness of 3-7 nm into PP matrix through TEM observations. On the contrary, nano-composite prepared by melt compounding at 180 °C for 3 min (without solid-state processing) showed the large stacked silicate layers in the PP matrix. Furthermore, instead of using alumina mortar, we carried out solid-state processing using internal mixer. X-ray diffraction pattern and TEM observation exhibited similar results. The solid-state processing led to delaminate of the silicate layers and attained the discrete dispersion.