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# EFFECT OF KAOLINITE ON MORPHOLOGY AND THERMAL CONDUCTIVITY OF POLYMER/CLAY NANOCOMPOSITES

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## ABSTRACT

In this study, kaolinite was used as a nanofiller for the fabrication of High density polyethylene (HDPE) and polypropylene (PP) nanocomposites with various low clay loadings. These nanocomposites are synthesized by a hybrid method in which solution blending was performed followed by melt mixing method, in which polyethylene grafted maleic anhydride (PE-g-MA) is used as a compatibilizer. The morphology of nanocomposites are explored by X-ray diffraction (XRD) and the thermal conductivity were measured using Differential Scanning Calorimetry (DSC). Morphology results indicates that intercalated and partial exfoliation structures are formed. The thermal conductivity measurements showed an obvious improvement in the estimated thermal conductivity of HDPE/kaolinte nanocomposites within the tested loadings and the optimum value (0.93 W m-1 oC-1 ) reached when clay loading was 2 wt %.In the other hand, no enhancement detected in PP composites due to the poor adhesion which attributed to the immiscibility between PP and HDPE in PE-g-MA. Also, Mohaddespour and Lewis Nielsen(LN) models have been used to investigate their predictive capability for determining thermal conductivity of those nanocomposites. A deviation from the experimental data was obtained which attributed to the missing information about the real molecular structure of the composite i.e dispersion of filler which is vital for the determination of related parameters used in the models.

***Keywords:*** *Thermal Conductivity, Polymer Nanocomposites, DSC, Kaolinite.*