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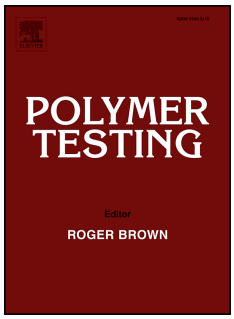

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Insights into crystallization and melting of high density polyethylene/graphene nanocomposites studied by fast scanning calorimetry

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Abstract

Graphene nanoplatelets (5 wt.%) with different diameters (5 and 25 x 10^{-6} m in diameter, 6 x 10^{-9} m in thickness) filled high density polyethylene nanocomposites were prepared by the melt-mixing method and the effect of graphene nanoplatelets on the polymeric matrix are then investigated by X-ray diffraction, polarized light microscopy, differential scanning calorimetry, fast scanning calorimetry, and rheology. Polarized light microscopy revealed that graphene nanoplatelets of 5 x 10^{-6} m promote the decrease in the size of the spherical aggregates during crystallization compared to larger nanoplatelets. From rheological measurements, it was found that even though the viscosity of the nanocomposites with increasing filler diameter was increased significantly compared to the neat polymer, the processability of these