

Rheological and Morphological Properties of Investment Casting Pattern Material Based on Paraffin Wax Fortified with Linear Low-Density Polyethylene and Filled with Poly Methyl Methacrylate

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Abstract : The rheological and morphological properties of paraffin wax, linear low-density polyethylene (LLDPE), and poly (methyl methacrylate) (PMMA) microbeads formulations were prepared via an extrusion process. The blends were characterized by rheometry, scanning electron microscopy (SEM), and Fourier transform infrared (FTIR) spectroscopy. The results indicated that the viscosity of the blends increased as compared to that of neat wax. SEM confirmed that LLDPE alters the wax crystal habit at higher concentrations. The rheological experimental data fitted with predicted data using the modified Krieger and Dougherty expression. The SEM micrograph of wax/LLDPE/PMMA revealed a near-perfect spherical nature for the filler particles in the wax/EVA polymer matrix. The FT-IR spectra show the deformation vibrations stretch of a long-chain aliphatic hydrocarbon (C-H) and also the presence of carbonyls absorption group denoted by -C=O- stretch.

Keywords : investment casting pattern, paraffin wax, LLDPE, PMMA, rheological properties, modified Krieger and Dougherty expression

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