

# THE EFFECT OF CRYSTALLINE PHASE MORPHOLOGY ON THE STRUCTURE AND PROPERTIES OF THE IMPACT POLYPROPYLENE COPOLYMER (IPC)

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## ABSTRACT

$\beta$ -nucleation in an impact polypropylene copolymer (IPC) and its highly crystalline fractions was investigated. The nucleating agents, calcium stearate (CaSt), pimelic (Pim) and adipic (Adi) acid, in different ratios (1:0, 1:2, 1:3) were dissolved in acetone to homogeneously mix them with IPC. The nucleation of IPC nucleated with individual and compounded nucleating agents (NAs) were investigated by differential scanning calorimetry, wide-angle X-ray diffraction and mechanical testing. The results showed that the nucleation effect is not only dependent on the nucleation efficiency (NE) of the individual NAs, but also on the crystallisation temperature and the ratios of the compounded NAs. The nucleated samples showed different  $\beta$ -crystal quantities. Pim showed the best nucleating efficiency, whether compounded with CaSt or not. Adi and CaSt, when compounded, showed better nucleating efficiency than Adi and CaSt individually. The impact strength and elongation at break were both improved at the expense of Young's modulus in the nucleated samples. The overall morphology of the samples was investigated by scanning electron microscopy (SEM), and the results showed that the NAs did not affect the overall morphology. Non-isothermal crystallisation kinetics of pure IPC and those nucleated with Pim-CaSt (1:2) and Pim-CaSt (1:3) were also investigated. The results show that the nucleated samples exhibit a heterogeneous crystal growth of solid-sheaf with three-dimensional structure.