SL 3.6

Mechanical Properties of Rotational Moulded Polyethylene/PET Microfibrillar Reinforced Composites

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Being a fast growing industry, the dominant usage of linear low density polyethylene (LLDPE) as the raw material for rotational moulding has shown insufficient mechanical properties for certain applications where strength and stiffness of the products are the main concerns. Worldwide rotational moulders have an urgent need for stronger, stiffer materials to be available, therefore introduction of reinforcements into rotomoulding process has attracted increasing attention [1]. However, past research involving the incorporation of various reinforcements in rotational moulding process has shown some unsatisfactory results, and yet there is not much being investigated from both the experimental and theoretical points of view about the underachievement of the addition of reinforcements. In addition to the technical problems arising from the use of glass fibres or spheres as reinforcement for rotational moulded parts a serious environmental impact also exists. For this reason a steady increasing effort is invested for replacement of these materials.
An attractive solution is the recently developed microfibrillar reinforced composites (MFC) based on polymer blends [2]. The mechanical parameters (tensile strength and Young's modulus) of MFC based on polyolefin/PET are up to five times higher as compared to the neat PP and PE matrices. As compared to short glass fibre (GF)-reinforced composites (30 wt% GF), having the same matrices, the MFC have approximately the same Young's modulus and tensile strength as well as much better (up to 10 times) deformation ability particularly for LDPE [3].
Blends of LLDPE/PET with a MFC structure are manufactured on commercial scale equipment and thereafter processed via rotational moulding. The sample are characterized morphologically and tested mechanically. The results obtained show that the MFC-concept has good application opportunities in the polymer processing via rotational moulding.

References

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