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Bio-Based Polyethylene/Rice Starch Composite Prepared by Twin Screw Extruder

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Abstract : Starch from rice was used as a filler in low density polyethylene in preparation of low density polyethylene/rice starch composite. This study aims to prepare LDPE/rice starch composites. Glycerol (GC) was used as a plasticizer in order to increase dispersion and reduce agglomeration of rice starch in low density polyethylene (LDPE) matrix. Low density polyethylene grafted maleic anhydride (LDPE-g-MA) was used as a compatibilizer to increase the compatibility between LDPE and rice starch. The content of rice starch was varied between 10, 20, and 30 %wt. Results indicated that increase of rice starch content reduced tensile strength at break, elongation, and impact strength of composites. LDPE-g-MA showed positive effect on mechanical properties which increased in tensile strength and impact properties as well as compatibility between rice starch and LDPE matrix. Moreover, the addition of LDPE-g-MA significantly improved the impact strength by 50% compared to neat composite. The incorporation of GC enhanced the processability of composite. Introduction of GC affected the viscosity after blending by reducing the viscosity at all shear rate. The presence of plasticizer increased the impact strength but decreased the stiffness of composite. Water absorption of the composite was increased when plasticizer was added.

Keywords : composite material, plastic starch composite, polyethylene composite, PE grafted maleic anhydride
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