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Effects of MgO whiskers on mechanical properties and crystallization behavior of PLLA/MgO composites

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Abstract

In this study, composites of stearic acid-modified magnesium oxide whiskers (Sa-w-MgO)/poly-L-lactic acid (PLLA) were prepared through solution casting, and the properties of the composites with different whisker contents were investigated in terms of crystallization, mechanical properties, water absorption, and hydrophilicity. The results showed that, in comparison to PLLA, the composites exhibited better mechanical properties and greatly improved crystallization behavior. At a whisker content of 1 wt%, Sa-w-MgO increased Young's modulus and tensile strength of PLLA by 78% and 17%, respectively, without a reduction of elongation rate at break. Meanwhile, the crystallinity of composites was also increased remarkably, which was 77% higher than that of PLLA at a whisker content of 1 wt%. Furthermore, the hydrophilicity of the composites was notably improved, which was beneficial to the cell affinity of the material, and an obvious decline in the water absorption rate was