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Effects of surface modification on dispersion, mechanical, thermal and dynamic mechanical properties of injection molded PLA-hydroxyapatite composites



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ABSTRACT

In this study, poly(lactic acid) (PLA)/hydroxyapatite (HA) composites were produced through extrusion and injection moulding. In order to foster good interaction between PLA and HA, a phosphate based modifier (Fabulase^(R) 361) was used to modify the HA surface. Spectroscopic analysis reveals that surface of the HA was effectively modified without changing the HA into another material. Morphological study shows effective dispersion of HA in the PLA matrix after modification, with significant influence on the composite properties. Thermal properties of the modified HA composite was improved, alongside an enhancement of about 25%, 20% and 42% in tensile, modulus and impact properties of the modified PLA-HA composite respectively. Furthermore, dynamic properties of the modified HA composite was notably improved with obvious reduction of the damping factor. Thus, surface modification was effective to enhance dispersion and compatibility of HA and PLA to produce polymeric biomaterials suitable for good load bearing applications.