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POLY(3-HYDROXYLBUTYRATE-CO-4-HYDROXYLBUTYRATE)/ TIN COMPOSITES

Dingsheng Yu, Xiaoye Liu, Maoshan Niu, Riwei Xu

College of Material Science and Engineering, Beijing University of Chemical Technology

yuds@mail.buct.edu.cn

Poly (3-hydroxybutyrate-co-4-hydroxybutyrate) [P (3HB-co-4HB)] as the natural product formed in microorganisms which can be used as the alternative materials of traditional non-biodegradable polymeric materials. The introduction of 4HB unit in pristine PHB can enhance the thermal stability and toughness of the materials. However, the low nucleation density and slow crystallization are two of serious problems to its application. Nano-titanium nitride (TiN) is a nano-size ceramic powder with a large surface area and high surface activity. Meanwhile, TiN has good compatibility with the polymer. The Poly(3-hydroxybutyrate-co-4-hydroxybutyrate) [P(3HB-co-4HB)]/nano-titanium nitride (TiN) composites were prepared by melting molding method. Universal testing machine, Differential Scanning Calorimeter (DSC), Polarizing Microscope (POM), X-ray Diffraction (XRD) and Thermal Gravimetric Analyzer (TGA) were employed to study the influence of mechanics, thermodynamics and crystal properties of P(3HB-co-4HB)/TiN system. Also, the tensile modulus and toughness are significantly improved. When the content of the TiN 0.05% and 0.1%, the composites exhibit the best overall performance, since TiN serve as nucleating agents which can improve the crystallization and toughness of [P(3HB-co-4HB)]