

论文

生物可降解聚丁二酸/苯基丁二酸丁二醇酯系列共聚物的合成及其结晶行为

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摘要 合成了一系列聚丁二酸/苯基丁二酸丁二醇共聚酯(PBSBS), 利用DSC、¹H-NMR和X射线等测试手段对共聚物组成、热力学性能、结晶性能、等温结晶行为进行了表征和研究. 结果表明, 含苯基的共聚单元的引入显著改变了聚丁二酸丁二醇酯(PBS)的热力学性能, 利用Hoffman-Week曲线得到的共聚物平衡熔点随共聚组分含量的增加显著降低. 玻璃化转变温度则明显升高, 结晶熔点符合无规共聚物的Flory方程. 此外, 利用Avrami方程对均聚物PBS以及共聚物PBSBS-10分别进行了等温结晶行为研究, 结果表明共聚使结晶速率降低, PBS和PBSBS-10的Avrami指数分别介于2.8~3.0和2.7~2.9之间, 结晶方式为三维生长异相成核, X射线测试结果表明共聚不影响晶体结构.

关键词 [聚丁二酸/苯基丁二酸丁二醇酯 \(PBSBS\)](#) [热力学性能](#) [等温结晶动力学](#)

分类号

SYNTHESIS AND CRYSTALLIZATION BEHAVIOR OF BIODEGRADABLE POLY(BUTYLENE SUCCINATE-co-BUTYLENE PHENYLSUCCINATE)

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Abstract A series of polyesters PBSBS, Poly(butylene succinate-co-butylene phenylsuccinate), were synthesized from the polycondensation of succinic acid and phenylsuccinic acid with 1,4-butanediol. The compositions and thermal properties of resulted homopolyesters and copolyesters were investigated by ¹H-NMR, differential scanning calorimetry (DSC) and X-ray diffraction. The results suggested that the introduction of the comonomer containing a phenyl side-group led to a change in thermal properties and crystallization behavior. The glass transition temperature increased with the increasing of the comonomer composition, while the equilibrium melting temperature obtained by the Hoffman-Weeks plot decreased significantly. Furthermore, an Avrami method was used to analyze the kinetics of isothermal crystallization of PBS and PBSBS-10. The Avrami exponents, estimated by Avrami plots, ranging from 2.8 to 3.0 for PBS and 2.7 to 2.9 for PBSBS-10, indicated that the mechanism of crystallization for both homopolyester and copolyester was a tridimensional growth with heterogeneous nucleation. Meanwhile, X-ray diffraction showed that there was almost no effect of the phenyl succinate unit on the crystal structure.

Key words [Poly \(butylene succinate-co-butylene phenyl succinate\)](#) [Thermal properties](#) [Isothermal crystallization kinetic](#)

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