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研究论文

聚乳酸-聚乙二醇嵌段共聚物晶行为研究

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摘要 用^{1}H NMR, SEC, XRD和DSC对聚乳酸(PLLA)-聚乙二醇(PEG)二嵌段共聚物进行了表征. 由于共聚物中两种组分比例的不同, 表现出某组分单独结晶或两种组分共同结晶. 用DSC和POM方法, 对两组分含量相当的共聚物进行了熔体结晶行为研究, 并采用Avrami方程进行了结晶动力学计算. 用Lauritzen-Hoffmann理论对PLLA-PEG结晶机理进行了分析. 在70~94 ℃范围内, 得到成核参数K_g(POM)=5.23×10^5 K^2. 共聚物的K_g和链折叠自由能σ_e都比均聚物的文献报道值高, 表明PEG链段的存在影响了PLLA的结晶, 使得其成核较均聚物困难.

关键词 聚乳酸 聚乙二醇 嵌段共聚物 熔体结晶

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Crystallization Behavior of Poly(*L*-lactide)-poly(ethylene glycol) Diblock Copolymers

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Abstract

Poly(*L*-lactide)-poly(ethylene glycol)(PLLA-PEG) diblock copolymers were characterized by ^{1}H NMR, SEC, XRD and DSC. Depending on the composition, one or two melting peaks were detected although both components were intrinsically semi-crystalline. A copolymer with equivalent block lengths was selected for melt crystallization studies by DSC and POM. The experimental data were calculated with Avrami equation. On the other hand, the crystallization characteristics of PLLA-PEG were analyzed by using Lauritzen-Hoffmann theory. The nucleation constant K_g(POM) was found to be 5.23×10^5 K_2 in the temperature range from 343 to 367 K. Both values of K_g and fold surface free energy σ_e of the copolymer are higher than those of the PLLA homopolymer, which suggests that the crystallization behavior of PLLA is affected by the presence of PEG block, nucleation being more difficult in the case of the copolymers.

Key words Poly(*L*-lactide) Poly(ethylene glycol) Block copolymers Melt crystallization

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