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材料化学工程与纳米技术

LLDPE/SEBS-g-MAH体系的等温结晶动力学

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摘要

采用差示扫描量热法（DSC）研究了SEBS-g-MAH对LLDPE等温结晶行为的影响，并通过偏光显微镜（POM）观察了LLDPE及LLDPE/SEBS-g-MAH共混体系的结晶形态。结果表明，SEBS-g-MAH的加入阻碍了LLDPE分子链的规则排列，影响了链段在结晶扩散迁移规整排列的速度，使得结晶速率变慢，结晶活化能升高，对LLDPE晶体生长起了抑制作用，晶粒尺寸减小。用Avrami方程进行等温结晶动力学研究表明，LLDPE/SEBS-g-MAH共混体系的半结晶时间$t_{1/2}$明显增大，Avrami指数n对结晶温度有依赖性，k_n值随温度的升高而减小。利用Hoffman理论计算了球晶生长过程中晶核的折叠表面自由能σ_e为0.136 J·m^{-2}，SEBS-g-MAH的加入使得σ_e增大了9.6%。

关键词

LLDPE SEBS-g-MAH 差示扫描量热法 等温结晶动力学

分类号

Isothermal crystallization kinetics of LLDPE/SEBS-g-MAH blends

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Abstract

The effect of SEBS-g-MAH on the isothermal crystallization behavior of LLDPE was studied by using DSC.The crystalline morphology of the LLDPE and LLDPE/SEBS-g-MAH blends was examined by using polarized optical microscope (POM）.The results demonstrated that due to partial destruction of crystal region，the crystallization rate of LLDPE decreased and the activation energy of crystallization increased with addition of SEBS-g-MAH.Addition of elastomer played an inhibition effect on crystal growth of LLDPE，and the grain size decreased.The isothermal crystallization process was described by the Avrami equation and the Avrami exponent n was related with crystallization temperature.The half crystallization time ($t_{1/2}$) of LLDPE/SEBS-g-MAH was much longer than that of pure LLDPE and the value of k_n decreased with increasing crystallization temperature.The σ_e，interfacial free energies per unit area perpendicular to LLDPE chains，of pure LLDPE and LLDPE/SEBS-g-MAH blends were calculated with the Hoffman theory.The result showed that σ_e of pure LLDPE was 0.136 J·m^{-2} and σ_e of LLDPE/SEBS-g-MAH blends increased by adding SEBS-g-MAH.

Key words

LLDPE SEBS-g-MAH DSC isothermal crystallization kinetic

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