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论文

聚ε-己内酯薄膜的受限结晶行为研究

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摘要 利用原子力显微镜(AFM)系统地研究了聚ε-己内酯(PCL)在物理受限空间, 即在薄膜、超薄膜中的结晶行为. 结果表明, PCL的结晶形态与薄膜的厚度有关. 当薄膜的厚度大于2R_g(R_g为回转半径)时, 高分子结晶形态呈现球晶; 当厚度介于R_g～2R_g之间时, 高分子结晶生成枝蔓或树枝状结构; 当厚度小于R_g时, 其结晶形态为“岛”状结构. 讨论了结晶温度、分子量与基底等对高分子结晶形态的影响. PCL在薄膜中的结晶是一个扩散控制的动力学过程, 其生长机理可以用有限扩散凝聚(DLA)来解释.

关键词 PCL超薄膜 结晶形态 AFM 回转半径 有限扩散凝聚

分类号

STUDIES ON CONFINED CRYSTALLIZATION BEHAVIOR OF POLYCAPROLACTONE THIN FILMS

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Abstract The confined crystallization behavior of polycaprolactone(PCL)in thin and ultrathin films was studied by AFM(atomic force microscopy). It was found that the crystalline morphology of PCL depended on the film thickness. When the thickness d>2R_g(radius of gyration),the polymer can crystallize into spherulites; when $R_g$$R_g$,the dense—branch morphology and dendrites could be found; when d<R_g,the“islands”structure could be obtained. Moreover. the effects of the crystallization temperature,substrate and the molecular weight on the cry-stalline morphology were discussed. It was shown that the crystallization of PCL in thin film is a diffusion-cuntrolled process,and it can be explained by diffusion—limited aggregation.

Key words PCL ultrathin films Crystalline morphology AFM Radius of gyration Diffusion-limited aggregation

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