

研究论文

原位聚合法制备聚酰亚胺/滑石粉复合薄膜聚集态结构的研究

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摘要:

用原位聚合法合成一系列不同滑石粉含量的聚酰胺酸/滑石粉(PAA/talc)溶液, 再将其热酰亚胺化制备出聚酰亚胺/滑石粉(PI/talc)复合薄膜. 偏光显微镜(POM)、广角X衍射(WXRD)和扫描电子显微镜(SEM)的观测结果表明, 滑石粉的引入使PAA形成一种丝状有序结构, 且随着热酰亚胺化的进行或者滑石粉含量的增加, 这种结构不但得以保持且越来越明显, 最终相互交错形成网状结构. 红外光谱(FT-IR)给出的结果表明, 滑石粉与PAA间存在氢键相互作用. 丝状结构的形成, 是在存在氢键的前提下滑石粉诱导被应力驱动的大分子链发生规整有序排列的结果.

关键词: 有机高分子材料 聚酰亚胺 聚集态结构 原位聚合 滑石粉 氢键

Study on morphology of polyimide/talc composite films prepared by in-situ polymerization

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Abstract:

A series of polyimide/talc (PI/talc) composite films with different contents of talc were prepared via thermal imidization of in-situ polymerized poly(amic acid)/talc (PAA/talc) solutions based on pyromellitic anhydride (PMDA), 4,4 -oxydianiline (ODA) and talc. The results confirmed that PAA macromolecular chains were induced to form silk-like ordered structure, and as a result of either the elevated imidization temperature or the increasing contents of talc, the texture become more and more obviously, yielding staggered network texture. The hydrogen bonding formed between the edges of talc and the active hydrogen of carboxyl groups and secondary amines in PAA macromolecular chains. The macromolecular chains could align orderly around the edge surfaces of talc and form the ordered structure due to the hydrogen bonding and the effect of internal stress.

Keywords:

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