

论文

溶胶-凝胶法制备丙烯酸树脂/TiO₂有机-无机杂化材料及其结构表征

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摘要 通过预水解的二氧化钛(TiO₂)溶胶与丙烯酸树脂共混或原位聚合的方法制备了均匀透明的丙烯酸树脂TiO₂有机-无机杂化材料. 考察了TiO₂溶胶制备方法、聚合物中—COOH官能团含量和杂化材料制备方法对杂化材料结构的影响. 索氏抽提实验表明聚合物中的羧酸官能团和无机TiO₂相间发生了交联反应, 且随着—COOH官能团含量的增加, 交联程度增大. 小角X射线散射(SAXS)结果发现, 杂化材料中TiO₂为疏松的三维网状结构, 且在纳米尺度范围内, 但这种三维网状结构随着TiO₂溶胶制备中水或酸的用量增加, 其致密度增加, 尺寸增大. 同原位聚合法相比, 共混法可制备出更均匀的杂化体系, 且TiO₂为单分散.

关键词 [溶胶-凝胶法](#) [TiO₂](#) [丙烯酸树脂](#) [有机-无机杂化材料](#)

分类号

PREPARATION OF ACRYLIC RESIN/TiO₂ ORGANIC-INORGANIC HYBRID BY SOL-GEL PROCESS AND CHARACTERIZATION OF ITS STRUCTURE

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Abstract Acrylic resin/titania organic-inorganic hybrid materials were successfully prepared by the *in situ* polymerization of acrylic monomers as well as by blending the synthesized thermoplastic acrylic resins with titania salts which were first prehydrolyzed from the precursor of Ti(O_n-Bu)₄. Effects of the amount of water and acid used for the preparation of TiO₂ sols, the —COOH content in the acrylic resin and preparing methods on the structure of hybrid materials were investigated. The Soxhlet extracting experiments proved that crosslinking reactions took place between the organic phase and the inorganic phase, leading to homogenous and transparent hybrid systems. Meanwhile, higher —COOH content resulted in higher crosslinking degree. The SAXS results showed that there existed titania networks with a loose structure and nano-scale size within the hybrids. Moreover, larger amount of water and acid in the sol-gel process led to larger size and denser titania organic phase. In comparison with the *in situ* polymerization, blending method could prepare more homogeneous hybrids with mono-dispersed titania.

Key words [Sol-gel](#) [TiO₂](#) [Acrylic resin](#) [Organic-inorganic materials](#)

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