

研究论文

超声辐照原位乳液聚合制备聚苯乙烯包覆碳纳米管复合材料的结构与性能

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摘要 采用超声辐照原位乳液聚合方法制备了聚苯乙烯(PS)包覆多壁碳纳米管(MWNTs)复合材料. 用TEM, FTIR, UV, XPS, GPC和TGA研究了复合材料的结构和性能. 结果表明, MWNTs对苯乙烯聚合过程具有抑制作用, 聚苯乙烯包覆MWNTs, 两者之间有较强的相互作用, 使复合材料的热性能得到改善, 起始分解温度从388 °C提高到422 °C.

关键词 [碳纳米管](#) [聚苯乙烯](#) [超声波](#) [原位乳液聚合](#) [复合材料](#)

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Structure and Properties of Polystyrene-encapsulated Multi-walled Carbon Nanotubes Composites Prepared Through Ultrasonically Initiated *in situ* Emulsion Polymerization

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Abstract Polystyrene-encapsulated multi-walled carbon nanotubes(MWNTs) composites were prepared by ultrasonically initiated *in situ* emulsion polymerization. The structure and properties of the obtained composites were investigated by TEM, FTIR, UV, XPS and GPC *etc.*. The results show that the *in situ* formed PS layers were encapsulated on the surface of MWNTs and there were strong interactions between them. Element oxygen was found to be introduced onto the surface of MWNTs during the polymerization process. Meanwhile, MWNTs also consumed the macromolecular free radicals generated nearby, leading to the transfer of PS macromolecular chains onto the surface of MWNTs and the termination of polymerization process. As a result, the relatively lower molecular weight and broader molecular weight distribution of the formed PS occurred in the obtained composites. TGA analyses proved that the thermal properties of the PS/MWNTs composites were greatly improved.

Key words [Carbon nanotube](#) [Polystyrene](#) [Ultrasonic wave](#) [In situ emulsion polymerization](#) [Composite material](#)

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