

材料化学工程与纳米技术

## SiO<sub>2</sub>-g-PS纳米微球的制备及其在增韧PP中的应用

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摘要

采用乳液聚合方法在纳米SiO<sub>2</sub>粒子表面接枝苯乙烯(St)单体,制备了具有核/壳结构的SiO<sub>2</sub>-g-PS纳米微球,用FTIR、TEM、XPS和TG分析了SiO<sub>2</sub>-g-PS的结构。结果表明,乳液聚合产物基本呈球形、SiO<sub>2</sub>为核、PS为壳的核壳结构。通过熔融共混工艺制备聚丙烯(PP)基复合材料,并对其力学性能进行了分析,结果表明,当SiO<sub>2</sub>-g-PS填充量较低[4%~6%(质量)]时, SiO<sub>2</sub>-g-PS/PP复合材料的冲击强度和拉伸强度明显提高,并对PP的结晶有明显的异相成核作用。

关键词

[乳液聚合](#) [聚苯乙烯](#) [增韧](#) [聚丙烯](#) [熔融共混](#)

分类号

## Preparation of polystyrene/SiO<sub>2</sub> nanosphere and its application in toughening PP matrix

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**Abstract**

SiO<sub>2</sub>-g-PS, nano-microspheres, were prepared by grafted styrene monomer on the surface of nano-SiO<sub>2</sub> particles with the emulsion polymerization method, and its surface and morphology were studied by TEM, FTIR, TG and XPS. The results showed that the SiO<sub>2</sub>-g-PS nano-microsphere had a structure of sphericity composed of PS and SiO<sub>2</sub> as core and shell respectively. A composite material of SiO<sub>2</sub>-g-PS nano-microsphere and polypropylene (PP) was prepared by the melt-blending process and the mechanical performance was investigated. The results showed that the impact and tensile strength of the composite material could be improved obviously when the loading of SiO<sub>2</sub>-g-PS nano-microsphere was as low as 4%—6% (mass), and a significant heterogeneous nucleation effect on the crystallization of PP was observed.

**Key words**

[emulsion polymerization](#) [polystyrene](#) [toughen](#) [polypropylene](#) [melt-blending](#)

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