

材料化学工程与纳米技术

## 溶胶-凝胶法制备PEW/SiO<sub>2</sub>杂化材料及表征

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摘要

通过熔融接枝反应将乙烯基三甲氧基硅烷(VTMS)接枝到聚乙烯蜡(PEW)分子链上,接枝物红外光谱(FTIR)的1090、1030、960 cm<sup>-1</sup>等处出现了一Si—O—CH<sub>3</sub>的特征吸收峰。以正硅酸乙酯(TEOS)为前驱体,混入接枝PEW中,通过溶胶-凝胶法(sol-gel)制备了PEW/SiO<sub>2</sub>杂化材料。使用透射电镜(TEM)和热重分析(TG)研究了杂化材料的形态及性能,结果表明,通过sol-gel可以制备SiO<sub>2</sub>含量为0.98%~4.12%的杂化材料,SiO<sub>2</sub>颗粒与PEW接枝物分子间具有良好的相容性,纳米SiO<sub>2</sub>的存在提高了PEW的耐热性能,当SiO<sub>2</sub>含量为3.75%时,PEW的分解温度提高了21.34℃。

关键词

[聚乙烯蜡](#) [乙烯基三甲氧基硅烷](#) [溶胶凝胶法](#) [正硅酸乙酯](#) [杂化材料](#)

分类号

## Preparation and characterization of PEW/SiO<sub>2</sub> hybrid materials

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### Abstract

The melt grafting reaction was employed to graft vinyl trimethoxysilane (VTMS) to polyethylene-wax (PEW), and the characteristic absorbance peaks at 1090 cm<sup>-1</sup>, 1030 cm<sup>-1</sup> and 960 cm<sup>-1</sup> in FTIR spectra proved the successful grafting. As a precursor, tetraethoxysilane (TEOS) was mixed with grafted PEW and then a PEW/SiO<sub>2</sub> hybrid material could be prepared by the sol-gel process. The morphology and properties of the hybrid were studied with FTIR, TEM and TG/DTA. The study indicates that the hybrid containing 0.98%—4.12% of SiO<sub>2</sub> could be prepared *via* the sol-gel process and good compatibility of the molecules of grafted PEW and SiO<sub>2</sub> particles was observed. The study also showed that the thermostability of PEW was improved at the presence of nano-SiO<sub>2</sub> particles. The decomposing temperature of PEW was increased by 21.34℃ when 3.75% of SiO<sub>2</sub> was present.

### Key words

[polyethylene-wax](#) [vinyl trimethoxysilane](#) [sol-gel process](#) [tetraethoxysilane](#) [hybrid materials](#)

DOI:

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