

材料化学工程与纳米技术

溶胶-凝胶法制备PET/SiO₂纳米复合材料及其TG、DSC分析

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摘要

采用溶胶-凝胶(sol-gel)法,将正硅酸乙酯和水加入到制备聚对苯二甲酸乙二酯(PET)的中间产物对苯二甲酸双羟乙酯(BHET)中,在液态下均匀混合,高温下快速发生溶胶-凝胶反应,再按PET缩聚反应制得PET/SiO₂纳米复合材料。通过TEM、TG、DSC对材料进行了表征和研究。结果表明,SiO₂在PET中均匀分散,其尺寸在10~100 nm之间,PET/SiO₂纳米复合材料的热降解活化能较普通PET有明显提高,但初始降解温度和结晶性能均有所降低。

关键词

[PET](#) [溶胶-凝胶法](#) [正硅酸乙酯](#) [二氧化硅](#) [复合材料](#)

分类号

Poly(ethylene terephthalate)/SiO₂ nanocomposites prepared by sol-gel method and their TG & DSC analysis

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Abstract

Poly(ethylene terephthalate)(PET)/SiO₂ nanocomposites were synthesized *via* the sol-gel method that involved two steps: terephthalic acid first reacted with excess ethylene glycol to form bis(hydroxyethyl) terephthalate (BHET); tetraethoxysilane (TEOS) was added into the BHET, and the sol-gel reactions proceeded at a high temperature to form the silica nanonetwork concurrent with polycondensation of BHET to produce the PET matrix. Transmission electron microscopy (TEM) showed that the sizes of silica particles were at nanoscale, and the nanoparticles were uniformly dispersed in the polymer matrix. Thermogravimetric analysis (TGA) results indicated that the activation energy of thermal degradation of the composites was largely increased. The nonisothermal crystallization ability of the composites was found to decrease according to differential scanning calorimetry (DSC).

Key words

[poly\(ethylene terephthalate\)](#) [sol-gel](#) [tetraethoxysilane](#) [silica](#) [nanocomposites](#)

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