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论文

PVA/SiO₂-TiO₂杂化电纺纤维膜的形态与性能

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摘要:

以正硅酸乙酯(TEOS)、钛酸四丁酯(TBT)和聚乙烯醇(PVA)为原料, 用溶胶凝胶法制备了PVA/(SiO₂-TiO₂)杂化纺丝液, 将其电纺成纤维膜. 红外光谱结果证实, PVA的羟基与TEOS和TBT水解后的羟基发生了缩合反应, 杂化电纺纤维膜以网络结构形式相结合; X射线衍射分析表明, 杂化电纺纤维膜的结晶度比纯PVA电纺纤维膜小; 扫描电镜表明, 随杂化纤维膜中无机相含量的增加, 纤维的直径不断增加, 纤维出现一定的弯曲和扭曲, 并伴有少量带状结构的纤维; 紫外-可见光谱结果表明, TiO₂的引入增加了纤维膜的抗紫外性; TGA热分析结果表明, 杂化纤维膜的耐热性能优于纯PVA电纺纤维膜的; 耐水性和稳定性测试表明, 杂化纤维膜的耐水性和稳定性优于纯PVA和PVA/SiO₂电纺纤维膜的.

关键词: 溶胶-凝胶法; 聚乙烯醇(PVA); SiO₂-TiO₂; 杂化; 电纺纤维

Morphology and Property of PVA/SiO₂-TiO₂ Hybrid Electrospun Fibers

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Abstract:

The spin solutions of PVA/SiO₂-TiO₂ hybrid materials were prepared by sol-gel method with tetraethoxysilane (TEOS), tetrabutyl titanate (TBT) and poly (vinyl alcohol) (PVA), then fiber membranes were obtained by electrospinning. FTIR results show that hydroxyl in PVA condenses with hydroxyl of hydrolyzing TEOS and TBT; the hybrid electrospinning fiber membranes are linked by the form of network configuration. XRD result indicates that the degree of crystallinity of hybrid electrospun fiber membranes decline comparing with pure PVA electrospun fiber membrane. SEM pictures reveal that the diameter of the electrospun fibers increase and some curved fibers exist with the increasing (SiO₂-TiO₂) contents. UV-Vis measurements show that the ability is improving of shielding to ultraviolet with the adding of TiO₂. TGA measurements suggest that the hybrid fiber shows better resistance to heat than pure PVA electrospun fiber. Water resistance and stability testing indicated that the hybrid fiber shows better water resistance and stability than pure PVA and PVA/SiO₂ electrospun fiber.

Keywords: Sol-gel method; Poly(vinyl alcohol)(PVA); SiO₂-TiO₂; Hybrid; Electrospinning fiber

收稿日期 2008-12-26 修回日期 网络版发布日期

DOI:

基金项目:

国家自然科学基金(批准号: 50373010)资助.

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