

研究论文

聚甲基硅氧烷纳米多孔薄膜的微孔结构分析

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摘要: 用旋涂工艺和致孔法制备了一组聚甲基硅氧烷纳米多孔薄膜,用红外吸收光谱(FT-IR)、热重分析(TGA)对其进行表征,用同步辐射光源进行小角X射线散射测试,在掠入射模式(GISAXS)下进行微孔结构分析。结果表明,聚甲基硅氧烷前驱体与致孔剂具有良好的相容性;薄膜的小角散射曲线均不遵守Porod定理、形成正偏离;所有纳米多孔薄膜具备孔分形特征;薄膜基体与孔结构之间存在微电子密度起伏,且薄膜孔径小于3 nm。

关键词: 有机高分子材料 聚甲基硅氧烷 掠入射小角X射线散射 纳米多孔薄膜 孔结构

Pore Structural Analysis on Poly(Methyl)silsesquioxane Porous Thin Films by Synchrotron Radiation Small Angle X - ray Scattering

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Abstract: A group of poly(methyl)silsesquioxane nanoporous thin films were prepared by pore - generating and spin - coating processes. The nanoporous thin films were characterized using Fourier transform infrared spectroscopy (FT - IR) and thermogravimetric analyzer (TGA). And their scattering profiles and scattering intensities of the group of samples with different porosity were obtained by small angle X - ray scattering (SAXS) in grazing incidence (GISAXS) mode. The results show that there is a good compatibility between the poly(methyl)silsesquioxane precursor and porogen. The films exhibit pore fractal characteristics with disagreement with Porod' s law and give out positive deviation, and the micro - density fluctuations between film substrate and pore structure existed in the system, having a maximum 3 nm of pore radius for the group of poly(methyl)silsesquioxane nanoporous thin films.

Keywords: organic polymer materials poly(methyl)silsesquioxane grazing - incidence small angle x - ray scattering nanoporous thin film, pore structure

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