

研究论文

超疏水有机--无机杂化凝胶的制备和表征

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摘要: 采用1,2--双--(三甲氧基硅基)--乙烷(BTME)和聚甲基含氢硅氧烷(PMHS)作为反应组分, 在无需模板剂的溶胶--凝胶体系中制备了孔壁镶嵌乙基和孔道表面挂载甲基的有机--无机杂化多孔凝胶材料。用固体硅核磁共振、傅里叶红外光谱、低温氮气吸附/脱附、高分辨透射电镜、接触角测定和热重分析等手段研究了材料的结构和性能。结果表明, 在PMHS/BTME质量比为1 : 8、碱量为0.08 g、水量为2 mL的溶胶--凝胶条件下, 制备出的疏水有机--无机杂化凝胶材料骨架稳定性良好, 结构性能优异(比表面积和孔体积分别为1076 m²/g和1.03 cm³/g)。

关键词: 复合材料 杂化材料 表征 聚甲基含氢硅氧烷 桥联硅氧烷

Facile Synthesis of Super-hydrophobic Hybrid Xerogels Using Poly(methylhydrogen)siloxane and Bridged Organosilica

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Abstract: Organic - inorganic hybrid mesostructures have been prepared using 1,2 - bis(trimethoxysilyl) ethane (BTME) and poly(methylhydrogen)siloxane (PMHS) as starting precursors via a facile sol-gel synthesis pathway in the absence of traditional surfactants. The dependence of structural properties on the preparation parameters was investigated by solid state²⁹ Si MAS NMR, high-resolution TEM, low temperature N₂ - adsorption/desorption isotherms, thermo-gravimetric analysis (TGA - DTA), Fourier transform infrared spectrophotometry (FT - IR) and water contact angle measurement. Characterization results showed that the hybrid material prepared under optimal conditions possesses stable framework structure and developed porosity with high specific surface area and pore volume of 1076 m²/g and 1.03 cm³/g, respectively.

Keywords: composites hybrid material characterization poly(methylhydrogen)siloxane bridgedorganosilica

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