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高比表面积Al2O3-TiO2二元气凝胶小球的制备

Preparation of High Specific Surface Area Alumina-Titania Binary Aerogel Beads

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关键词:
Al2O3-TiO2; 二元气凝胶小球; 溶胶–凝胶法; 比表面积; 酸量; Al2O3-TiO2; Binary Aerogel Beads; Sol-Gel Technology; Specific Surface Area; Acid Amounts

摘要:
以拟薄水铝石和水合硫酸氧钛为前驱体，水为溶剂，采用溶胶–凝胶、烃氨成球法、老化和控制干燥制备出大比表面积的Al2O3-TiO2复合气凝胶小球。研究其理化性质并考察了不同铝钛组成及温度对孔结构和酸量的影响。采用了SEM、XRD、FT-IR、NMR、N2吸附–脱附法、NH3-TPD等手段对所制得的复合氧化物进行了表征。结果显示，复合氧化物中TiO2为锐钛矿型，Al2O3为无定形。通过混合溶胶共水解缩聚及老化和控制干燥，使不同铝/钛比的二元气凝胶小球的比表面积均达到200 m2/g以上，总酸量达到0.8 mmol NH3/g以上。不同铝/钛比的二元气凝胶小球比表面积和酸量相近，孔径可通过铝/钛比调整。

Crack-free and high surface area mesoporous alumina-titania binary aerogel beads have been synthesized by sol-gel technology, the ball dropping method (BDM), extended aging and gradient drying method with pseudo boehmite and dehydrate titanyl sulfate as precursors and water as solvent. The effects of composition and calcination temperature on pore structure and acid amounts have been investigated and discussed. The binary aerogel beads have been charac-terized by scanning electron microscopy (SEM), X-ray powder diffraction (XRD), Fourier-transform infrared spectros-copy (FT-IR), solid state nuclear magnetic resonance (NMR), nitrogen adsorption/desorption analysis and ammonia- temperature programmed desorption (TPD). The obtained aerogel beads show surface area of 200 m2/g and acid amounts of 0.8 mmol NH3/g respectively. The binary aerogel beads with different constitutes show similar specific sur-face area and acid amounts. The pore size of aerogel beads can be modified by changing composition and calcination temperature.

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