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研究论文

SiO_2含量对氧化铁基Fe_2O_3--SiO_2二元复合干凝胶性能的影响

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摘要: 以水合氯化铁和正硅酸乙酯为前驱物, 通过溶胶--凝胶法制备不同SiO2含量的氧化铁基Fe2O3--SiO2二元复合凝胶, 利用冷冻干燥法对凝胶进行干燥得到复合干凝胶。分别采用BET、IR和SEM对复合凝胶的比表面积、孔结构、红外吸收峰和表面形貌进行分析。结果表明, 复合凝胶的比表面积和孔体积随着SiO2含量的增加而增加, 同时SiO2的引入改变了Fe2O3凝胶的骨架结构, 使得Fe2O3凝胶中部分Fe--O--Fe键与Si原子形成一定数量的Fe--O--Si键, 形成了以Fe2O3为主要基体的Fe2O3-SiO2复合凝胶。SiO2的引入有效提高了复合凝胶的比表面积, 改善了凝胶的孔结构, 为制备二元复合凝胶为骨架的高能纳米铝热剂奠定基础。

关键词: 复合材料 复合凝胶 比表面积 溶胶--凝胶法 孔结构

Effect of SiO_2 Addition on the Properties of Fe_2O_3-SiO_2 Binary Composite Xerogels

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Abstract: The iron oxide - based Fe2O3 - SiO2 binary composite xerogels were prepared by sol-gel and freeze-drying method using FeCl3 • 6H2O and TEOS as precursors. The pore structure and specific surface area of the binary xerogels were investigated by means of nitrogen adsorption experiments, FT - IR spectroscopy and SEM. The results show that the specific surface area and the pore volume increase with the silica content, which is caused by Fe - O - Si bonds formed in the binary xerogels. The addition of SiO2 improves the specific area and pore structure of the binary composite xerogels. These will provide a basis for their application in the nano - thermite.

Keywords: composites composite gel specific surface area sol-gel pore structure

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