

研究论文

一种新型储氢材料——改性四氧化三铁的储氢性能研究

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摘要 以金属Mo, Al, Cr, W可溶盐为添加物, 通过共沉淀法由FeCl₃和(NH₄)₂Fe(SO₄)₂·6H₂O的水溶液制备了单金属添加的Fe₃O₄改性储氢材料. 采用循环储氢性能评价方法, 研究了材料的储氢性能; 利用X射线粉末衍射、SEM扫描电镜和BET比表面积测试手段, 分析了材料储-放氢前后的微观结构. 结果表明: 添加了Mo金属的Fe₃O₄材料四次循环的放氢温度最低, 为310~314 °C(放氢速率为300 μmol·min⁻¹·Fe-g⁻¹), 低于目前同类最好的储氢材料(50 °C左右); 对材料的微观结构研究表明: 采用本文方法制备的金属添加的Fe₃O₄储氢材料其粒度大约在50~70 nm. 此外, 材料的催化活性主要与掺杂的金属类型和材料粒度的大小有关.

关键词 [改性Fe₃O₄](#) [储氢材料](#) [储氢性能](#) [循环稳定性](#)

分类号

Studies on Hydrogen Storage Properties of a New Material—Modified Fe₃O₄

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Abstract Modified Fe₃O₄ samples for hydrogen storage with different metal additives (Mo, Al, Cr, W) used in this work were prepared by precipitation of Fe₃O₄ from the aqueous solution of FeCl₃ and (NH₄)₂Fe(SO₄)₂·6H₂O. The apparatus used for the reduction and reoxidation of Fe₃O₄-Mo, Fe₃O₄-Al, Fe₃O₄-Cr, Fe₃O₄-W and Fe₃O₄-none samples was a value system of the performance of hydrogen storage with a fixed bed of the samples at the center of a quartz-made tubular reactor. These samples were characterized and measured by X-ray powder diffraction, scanning electron microscope and BET surface area analyzer. The results show that the temperatures of the samples Fe₃O₄-Mo in their 4 cyclic tests in the range of 310~314 °C (the flow rate of H₂ was 300 μmol·min⁻¹·Fe-g⁻¹ at this time), were lower than that of the Fe₃O₄-none, and even lower than that of similar best one by 50 °C. Moreover, the size of the samples Fe₃O₄ prepared by the present method used in this paper was 50~70 nm. Furthermore, cyclic stabilities and catalytic activities of the samples depended on the type of added metal and the size of the particle of the samples.

Key words [modified Fe₃O₄](#) [hydrogen storage material](#) [hydrogen storage property](#) [cyclic stability](#)

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