

研究论文

纳米 $\gamma\text{-Fe}_2\text{O}_3$ 粉体的合成与磁性增强研究

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**摘要** 采用微乳法合成出氧化铁的前驱体——纳米 $\beta\text{-FeOOH}$ , 分别以 $\beta\text{-FeOOH}$ 与添加剂壬基酚聚氧乙烯醚(NP-4)以物质量的比( $n$ )为4, 5, 100添加NP-4, 混合煅烧. 采用拉曼光谱分析了样品中炭含量及分布, 并且用透射电镜观测产物的形貌和粒径, 采用磁强计观测产物磁性的变化. 结果得出, 对 $n=5$ 或破乳所得凝胶煅烧, 所得样品皆为分散均匀的四方颗粒状, 且为磁性明显增强的纳米氧化铁 $\gamma\text{-Fe}_2\text{O}_3$ .

还分别讨论了样品中炭含量以及颗粒形状对比饱和和磁化强度 $\sigma_s$ 、矫顽力、矩形比的影响.

**关键词** NP-4添加剂  $\gamma\text{-Fe}_2\text{O}_3$  磁性增强

分类号

## A Study on Synthesis of $\gamma\text{-Fe}_2\text{O}_3$ Powder and Magnetism Enhancement

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**Abstract** The nano- $\beta\text{-FeOOH}$  for precursor of  $\gamma\text{-Fe}_2\text{O}_3$  was synthesized by microemulsion method, then the  $\beta\text{-FeOOH}$  was calcined by mixing with additive polyoxyethylene nonyl phenyl ether (NP-4) in the molar ratio of  $\beta\text{-FeOOH}/\text{NP-4}$  as 4, 5 and 100 respectively. The carbon content and distribution in product were determined by Raman scattering, morphology and particle size of the product were observed by TEM, and the variations of the product magnetism with the morphology were measured by VSM. By calcining  $\beta\text{-FeOOH}$  with NP-4 in the molar ratio of 5, or calcining gelatin of broken emulsion, the dispersed symmetrical square  $\gamma\text{-Fe}_2\text{O}_3$  with enhanced magnetism was observed. The effects of carbon content and nanoparticle morphology on saturation magnetization  $\sigma_s$ , coercive force, and squareness were also discussed in this paper.

**Key words** additive NP-4  $\gamma\text{-Fe}_2\text{O}_3$  magnetic enhancement

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