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研究论文

二次化学共沉淀法制备片状钡铁氧体的形成历程及磁性能研究

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摘要: 采用二次化学共沉淀法制备出六角或近六角片状BaFe₁₂O₁₉, 其颗粒径向尺寸和径厚比分别为0.4--2 μm和4--20。通过XRD、FTIR、TG/DTA及SEM/EDS分析技术研究了片状BaFe₁₂O₁₉的形成历程。结果表明: 先驱体为非晶态BaCO₃、低结晶态Fe(OH)₃和晶态α--Fe₂O₃包覆原料BaFe₁₂O₁₉复合物; 先驱体在焙烧过程中经过Fe(OH)₃脱水、BaCO₃分解反应、中间相α--Fe₂O₃和BaO反应得到终产物BaFe₁₂O₁₉。基于形成历程, 六角片状BaFe₁₂O₁₉较原料BaFe₁₂O₁₉表现出显著提高的颗粒径向尺寸和径厚比、较高的纯度和略低的结晶有序程度, 进而表现出明显提高的矫顽力、略低的饱和磁化强度和剩余磁化强度。

关键词: 无机非金属材料 片状BaFe₁₂O₁₉ 二次化学共沉淀法 磁性能 形成历程

Synthesis of the Plate - shaped Barium Ferrites by the Second Chemical Co - precipitation Method and Investigation of the Magnetic Properties

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Abstract: Hexagonal plate - shaped BaFe₁₂O₁₉ ferrites are prepared by the second chemical coprecipitation method using co-precipitation synthesized - BaFe₁₂O₁₉ ferrites as template materials. The particle size of the prepared plate-shaped BaFe₁₂O₁₉ ferrites is in the range of 0.4-2 μm with a diameter-to-thickness ratio of 4 - 20. The synthesis process is studied by using XRD, FTIR, TG/DTA, SEM/EDS. It is shown that the precursor was a composite of BaFe₁₂O₁₉ coated by non - crystalline BaCO₃, low-crystalline Fe(OH)₃ and crystalline α-Fe₂O₃. During calcinations, the precursor experiences dehydration of Fe(OH)₃, decomposition of BaCO₃, and the reaction of α-Fe₂O₃ and BaO, and finally produces BaFe₁₂O₁₉. The prepared plated - shaped BaFe₁₂O₁₉ ferrite presents a higher coercivity and lower saturation magnetization and remanence, owing to its higher purity, slightly poor crystallinity, larger radial size and diameter - length ratio.

Keywords: inorganic non - metallic materials plate - shaped BaFe₁₂O₁₉ second chemical co-precipitation method magnetic property formation

收稿日期 2011-03-25 修回日期 2011-09-08 网络版发布日期 2012-02-10

DOI:

基金项目:

总装备部预研51310060303资助项目。

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参考文献:

[1] ZHOU Zhigang, Magnetic Ferrite Materials (Beijing, Science Press, 1981) p.23

[2] GE Fuding, ZHU Jing, CHEN Limin, The dependence of properties of absorbing

- materials on the shape of particle absorbers and, Aerospace Materials & Technology, 05, 42(1996) 
- [3] George C. Hadjipanayis, Gary A. Prinz, Science and Technology of Nanostructured Magnetic Materials (NewYork, Plenum Press, 1991) p.497 
- [4] X.Y.Liu, J.Wang, L.M.Gan, S.C.Ng, Improving the magnetic properties of hydrothermally synthesized barium ferrite, Journal of Magnetism and Magnetic Materials, 195, 452 (1999) 
- [5] A.Mali, A.Ataie, Structural characterization of nanocrystalline BaFe₁₂O₁₉ powders synthesized by sol-gel combustion route, Scripta Materialia, 53, 1065(2005) 
- [6] L.X.Wang, Q.T.Zhang, The effect of pH values on the phase formation and properties of BaFe₁₂O₁₉ prepared by citrate-EDTA complexing method, Journal of Alloys and Compounds, 454, 410(2008) 
- [7] S.R.Janasi, M.Emura, F.J.G.Landgraf, D.Rodrigues, The effects of synthesis variables on the magnetic properties of coprecipitated barium ferrite powders, Journal of Magnetism and Magnetic Materials, 238, 168(2002) 
- [8] Q.L.Li, Y.F.Wang, Preparation of strontium ferrite microtubules with a memplate method and their magnetic property analysis, Acta Chimica Sinica, 10, 1063(2009)
- [9] W.Zhong, W.P.Ding, N.Zhang, Key step in synthesis of ultrafine BaFe₁₂O₁₉ by sol-gel technique, Journal of Magnetism and Magnetic Materials, 168, 196(1997) 
- [10] G.H.Mu, X.F.Pan, H.G.Shen, M.Y.Gu, Preparation and magnetic properties of composite powders of hollow microspheres coated with barium ferrite, Materials Science and Engineering: A, 445-446, 563(2007) 
- [11] TAN Yuzhuo, MENG Jinhong, SUN Jie, CAO Xiaohui, Formation process of M-type Ba-ferrite from precipitation-toptactic reaction method, Chinese Journal of Inorganic Chemistry, 24(12), 43(2008)
- [12] CAO Xiaohui, TAN Yuzhuo, MENG Jinhong, SUN Jie, Synthesis process of Ba-ferrites from α -FeOOH and γ -FeOOH and investigation of magnetic properties, 55(3),274 (2010) 
- [13] S.S.Jewur, J.C.Kuriacose, Studies on the thermal decomposition of ferric hydroxide, Thermochimica Acta., 19, 195(1977) 
- [14] V.Ciupina, S.Zamfirescu, G.Prodan, Evaluation of mean diameter values using scherrer equation applied to electron diffraction images, Nanotechnology-Toxicological Issues and Environmental Safety, 231(2007)
- [15] YAO Zhiqiang, WANG Qin, ZHONG Bing, The preparation of the ultrafine powder of barium ferrite by the supercritical fluid drying (SCFD) method—II. The study of the IR spectra, Functional Materials, 29, 471(1998)
- [16] M.Kiyama, Chemistry of ferrouy hydroxide and ferric hydroxide, Recording Materials of Chemistry Information, 1, 32(1980)
- [17] Y.A.Sung, S.W.Lee, In-Bo Shim, Growth of nanocrystalline barium ferrite thin films by sol-gel method, Physica Status Solidi, 189, 893(2002) 
- [18] LI Yinyuan, LI Guodong, Physics of Ferrites (Beijing, Science Press, 1978) p.34

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2. 杨武涛 杨卫华 付芳.PEG/CPB复配改性二氧化铅电极的制备和性能[J]. 材料研究学报, 2012,26(1): 8-12
3. 刘义 李海金 张清 刘厚通.钙钛矿型热电氧化物 $Y_{0.95}R_{0.05}CoO_3$ ($R=Ca, Sr, Ba$)的制备和热电性能[J]. 材料研究学报, 2012,26(1): 31-36
4. 薛文斌 金乾 杜建成 华铭 吴晓玲.不锈钢表面阴极微弧电沉积氧化铝膜层的性能[J]. 材料研究学报, 2012,26(1): 21-25
5. 殷大根 朱亚波 杜勇 刘晓霞 刘章生.微米螺旋碳纤维的电容特性[J]. 材料研究学报, 2012,26(1): 73-77
6. 朱德如 刘先松 胡锋 JOSE Luis Menendez.明显增强的镧掺杂锶铁氧体的磁光克尔效应[J]. 材料研究学报, 2012,26(1): 91-95
7. 魏晓玲 杨晖 沈晓冬.TiO₂掺杂对Na-β"-Al₂O₃性能的影响[J]. 材料研究学报, 2011,25(6): 597-601
8. 吴燕飞 黄英 张银铃 牛磊.Me₂--W型钡铁氧体的制备及其电磁性能研究[J]. 材料研究学报, 2011,25(6): 607-612
9. 吴宏伟 史铁钧 谭德新.Fe₂O₃对聚芳基乙炔树脂石墨化的影响研究[J]. 材料研究学报, 2011,25(6): 661-666
10. 彭家惠 瞿金东 张建新 邹辰阳 陈明凤.EDTA吸附特性及其对α半水脱硫石膏晶形的影响[J]. 材料研究学报, 2011,25(6): 566-572