

研究论文

明显增强的镧掺杂锶铁氧体的磁光克尔效应

朱德如¹, 刘先松¹, 胡锋¹, JOSE Luis Menendez²

- 1. 安徽大学物理与材料科学学院 磁性材料安徽省工程技术研究中心 合肥 230039
- 2. Universidad de Oviedo, Parque Tecnológico de Asturias, 33428 Llanera, Spain

摘要: 采用陶瓷法制备了稀土La³⁺掺杂的锶铁氧体Sr_{1-x}La_xFe₁₂O₁₉ (x=0, 0.05, 0.10, 0.15, 0.20)。系统地研究了La³⁺取代对材料结构、磁性能的影响,特别是对磁光克尔效应的影响。实验结果表明,La³⁺取代Sr²⁺能显著增强锶铁氧体的磁光克尔效应,当x=0.20时,与SrFe₁₂O₁₉相比,磁光克尔效应增加到了1%。

关键词: 无机非金属材料 锶铁氧体 镧掺杂 磁性能 磁光克尔效应

Remarkable Enhancement of Magneto-Optical Kerr Effect of Strontium Ferrites by Doping La

ZHU Deru¹, LIU Xiansong¹, HU Feng¹, Jose Luis Menendez²

- 1. Engineering Technology Research Center of Magnetic Materials, Anhui Province, School of Physics & Materials Science, Anhui University, Hefei 230039
- 2. Universidad de Oviedo, Parque Tecnológico de Asturias, 33428 Llanera, Spain

Abstract: La-substituted strontium ferrites, according to the formula Sr_{1-x}La_xFe₁₂O₁₉ (x = 0, 0.05, 0.10, 0.15, 0.20), were prepared by the conventional ceramic technology. The influences of La³⁺ substitution on the structures, magnetic properties and magneto-optical Kerr effect of Sr_{1-x}La_xFe₁₂O₁₉ were systematically investigated. The experimental results showed that a strong magneto-optical activity was induced in strontium ferrites by doping La. When x = 0.20, the magneto-optical activity of the sample Sr_{0.8}La_{0.2}Fe₁₂O₁₉ was 1% higher than that of SrFe₁₂O₁₉.

Keywords: inorganic non-metallic materials strontium ferrites La substitution magnetic properties magneto-optical Kerr effect

收稿日期 2011-03-30 修回日期 2011-05-10 网络版发布日期 2012-02-10

DOI:

基金项目:

国家自然科学基金51072002, 安徽省教育厅重点科研项目KJ2010A008, 安徽大学"211工程"学术创新团队02303402科研课题和安徽大学研究生学术创新研究y9h090013资助项目。

通讯作者: 刘先松

作者简介:

通讯作者E-mail: xiansongliu@ahu.edu.cn

参考文献:

- [1] S.A.Oliver, S.D.Yoon, I.Kozulin, M.L.Chen, C.Vittoria, Growth and characterization of thick oriented barium hexaferrite films on MgO (111) substrates, Appl. Phys. Lett., 76, 3612(2000)

扩展功能

本文信息

- Supporting info
- PDF(828KB)
- [HTML] 下载
- 参考文献[PDF]
- 参考文献

服务与反馈

- 把本文推荐给朋友
- 加入我的书架
- 加入引用管理器
- 引用本文
- Email Alert
- 文章反馈
- 浏览反馈信息

本文关键词相关文章


















- 无机非金属材料
- 锶铁氧体
- 镧掺杂
- 磁性能
- 磁光克尔效应

本文作者相关文章

- 刘先松

PubMed

- Article by Liu,X.S

- [2] A.Vijayalakshmi, N.S.Gajbhiye, Magnetic properties of single-domain SrFe₁₂O₁₉ particles synthesized by citrate precursor technique, *J. Appl. Phys.*, 83, 400(1998) 
- [3] K.N.Reddy, V.N.Mulay, Magnetic properties of W-type ferrites, *Mater. Chem. Phys.*, 76, 75(2002) 
- [4] P.Hernandez-Gomez, P.G.Bercoff, O.Alejos, C.Torres, J.M.Munoz, C.Francisco, J.I.Iniguez, H.R.Bertorello, Magnetic disaccommodation in Sr hexagonal ferrites with X-phase (2SrO • 15Fe₂O₃) initial composition, *Physica B*, 320, 267(2002) 
- [5] Z.Pang, X.Zhang, B.Ding, D.Bao, B.Han, Microstructure and magnetic microstructure of La+Co doped strontium hexaferrites, *J. Alloy. Compd.*, 492, 691(2010) 
- [6] N.Rezlescu, C.Doroftei, E.Rezlescu, P.D.Popa, The influence of heat-treatment on microstructure and magnetic properties of rare-earth substituted SrFe₁₂O₁₉, *J. Alloy.Comp.*, 451, 492(2008) 
- [7] N.Chen, K.Yang, M.Y.Gu, Microwave absorption properties of La-substituted M-type strontium ferrites, *J. Alloy. Compd.*, 490, 609(2010) 
- [8] X.S.Liu, P.Hernández-Gomez, Y.X.Deng, K.Huang, X.B.Xu, S.X.Qiu, D.Zhou, Analysis of magnetic disaccommodation in La³⁺-Co²⁺-substituted strontium ferrites, *J. Magn. Magn. Mater.*, 321, 2421(2009) 
- [9] X.S.Liu, W.Zhong, S.Yang, Z.Yu, B.X.Gu, Y.W.Du, Influences of La³⁺ substitution on the structure and magnetic properties of M-type strontium ferrites, *J. Magn. Magn. Mater.*, 238, 207(2002) 
- [10] N.Langhof, M.Gobbels, Hexaferrites and phase relations in the iron-rich part of the system Sr-La-Co-Fe-O, *J. Solid State Chem.*, 182, 2725(2009) 
- [11] D.Seifert, J.Topfer, F.Langenhorst, J.M.Breton Le, H.Chiron, L.Lechevallier, Synthesis and magnetic properties of La-substituted M-type Sr hexaferrites, *J. Magn. Magn. Mater.*, 321, 4045(2009) 
- [12] D.A.Allwood, G.Xiong, M.D.Cooke, C.C.Faulkner, D.Atkinson, N.Vernier, R.P.Cowburn, Submicrometer ferromagnetic NOT gate and shift register, *Science*, 296, 2003(2002) 
- [13] R.P.Cowburn, M.E. Welland, Room temperature magnetic quantum cellular automata, *Science*, 287, 1466(2000) 
- [14] C.Calle, V.H.Calle, F.Cuellar, A.Cortes, D.Arias, W.Lopera, P.Prieto, O.Guzmán, G.A.Mendoza, Magneto-optical Kerr effect in NiZn ferrite films of variable thickness, *Physica B*, 384, 103(2006) 
- [15] X.S.Liu, W.Zhong, S.Yang, Z.Yu, B.X.Gu, Y.W.Du, Structure and magnetic properties of La³⁺-substituted strontium hexaferrite particles prepared by sol-gel method, *Phys. Stat. Sol. (a)*, 193, 314(2002) 
- [16] X.S.Liu, P.Hernandez-Gomez, K.Huang, S.Q.Zhou, Y.Wang, X.Cai, H.J.Sun, B.Ma, Research on La³⁺-Co²⁺-substituted strontium ferrite magnets for high intrinsic coercive force, *J. Magn. Magn. Mater.*, 305, 524(2006) 
- [17] C.Singh, S.B.Narang, I.S. Hudiara, Y.Bai, F.Tabatabaei, Static magnetic properties of Co and Ru substituted Ba-Sr ferrite, *Mat. Res. Bull.*, 43, 176(2008) 
- [18] C.Sauer, U.Kobler, W.Zinn, High field Mossbauer effect study of LaFeO, *J. Phys. Chem. Solids*, 39, 1197(1978) 

本刊中的类似文章

1. 曹晓晖 陈威宏 刘宇 孙杰 曹晓晖 王文举 于名讯.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[J]. 材料研究学报, 2012,26(1): 107-112
2. 豆喜华 赵韦人 宋恩海 周国雄 易春雨 周民康.紫外激发蓝色荧光粉 $Sr_{2-x-y}B_5O_9Cl:xEu^{2+}, yTb^{3+}$ 的合成和发光性能[J]. 材料研究学报, 2012,26(1): 96-100
3. 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
4. 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
5. 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
6. 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
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