材料研究学报 >>2011 >>25 >>(5)

材料研究学报 2011, 25(5) 534-538 DOI: ISSN: 1005-3093 CN: 21-1328/TG

研究论文

$LaPO_4:Eu^{3+}$纳米荧光粉的发光强度影响因素

吴春芳, 王育华

兰州大学物理科学与技术学院 兰州 730000

摘要: 通过改变水热反应中的原料---磷源, 制备了不同尺寸大小的LaPO4:Eu3+纳米荧光粉。XRD分析表明, 所有的水热反应产物均可归属为单斜晶系。水热产物再经900℃的热处理后, aPO4:Eu3+荧光粉晶粒尺寸变大, 同时结晶度提高。通过对比不同尺寸的LaPO4:Eu3+荧光粉在紫外和真空紫外激发两种模式下的发光强度, 为晶粒大小在紫外和真空紫外激发两种不同的激发模式下对荧光粉发光强度的影响完全不同。

关键词: 无机非金属材料 稀土离子 磷酸盐 纳米材料 荧光

Study on the Emission Intensity of Nano $LaPO_4:Eu$ Phosphor

WU Chunfang, WANG Yuhua

School of Physical Science and Technology, Lanzhou University, Lanzhou 730000

Abstract: LaPO4:Eu3+ nanophosphors with different sizes were prepared by hydrothermal reaction with different phosphorus sources. The results by XRD show that all products were ascribed to monoclinic crystal. The size of the products became larger and the crystallization was improved after heat treatment at 900^{o}C. The compared results of the emission intensity of samples with different sizes under different excitations showed that the effect of the crystal size on the emission intensity of the samples excited under UV and VUV sources is quite different.

Keywords: inorganic non-metallic materials rare earth ion phosphate nano-meter material luminescence

收稿日期 2011-06-02 **修回日期** 2011-07-04 **网络版发布日期** 2011-10-25

DOI:

基金项目:

甘肃省自然科学基金1010RJZA109资助项目。

通讯作者: 吴春芳

作者简介:

通讯作者E-mail: wuchf@lzu.edu.cn

参考文献:

[1] R.P.Rao, D.J.Devine, RE-activated lanthanide phosphate phosphors for PDP applications, J.lumin, 87-89, 1260(2000)

[2] X.Y.Wu, H.P.You, H.T.Cui, X.Q.Zeng, G.H.Hong, C.H.Kim, C.H.Pyun, B.Y.Yu, C.H.Park, Vacuum ultraviolet optical properties of (La, Gd)PO4:RE3+ (RE=Eu, Tb), Mater. Res. Bull., 37(9), 1531(2002)

[3] K.S.Sohn, J.Lee, W.Jeon, H.D.Park, Combinatorial searching for Tb3+-activated phosphors of high efficiency at vacuum UV excitation, J. Electro. Soc., 150(8), H182 (2003)

[4] K.K.Lee, Y.C.Kang, Vacuum ultraviolet characteristics of fine GdPO4: Tb phosphor particles with spherical shape, Jpn. J. Appl. Phys., 41, 5590(2002)

[5] K.Y.Jung, K.K.Lee, Photoluminescence characteristics of spherical LnPO4(Tb, Mn) phosphor particles under the UV and VUV illumination, J. Mater. Sci. Lett., 22, 1527 (2003)

[6] H.S.Lai, B.J.Chen, W.Xu, Y.H.Xie, X.J.Wang, W.H.Di, Fine particles (Y,Gd) PxV1−xO4:Eu3+ phosphor for PDP prepared by coprecipitation reaction, Mater. Lett., 60(11), 1341(2006)

[7] C.F.Wu, Y.H.Wang, J.Wei, Hydrothermal synthesis and luminescent properties of LnPO4:Tb (Ln=La, Gd) phosphors under VUV excitation, J.Alloy and Comp., 436(1-2), 383(2007)

[8] G.Wakefield, H.A.Keron, P.J. Dobson, J.L.Hutchison, Synthesis and properties of sub-50-nm europium oxide nanoparticles, J. Colloid Interface Sci., 215(1), 179(1999)

[9] H.K.Jung, D.S.Park, Y.C.Park, Preparation and characterization of ZnGa2O4:Mn phosphors by multistage precipitation method, Mater. Res. Bull., 34(1), 43(1999)

[10] D.K.Williams, B.Bihari, B.M.Tissue, Preparation and fluorescence spectroscopy of bulk monoclinic Eu3+:Y2O3 and comparison to Eu3+:Y2O3 nanocrystals, J. Phys. Chem., B102(6), 916(1998)

[11] TONG Jingang, WU Chunfang, WANG Yuhua, CHEN Zuohui, Synthesis of nanorod GdPO4:Eu3+ phosphor and its photoluminescent properties, Acta Physica Sinica, 58 (1), 585(2009)

[12] B.M.Tissue, H.B.Yuan, Structure, particle size, and annealing of gas phase-condensed Eu3+:Y2O3 nanophosphors, J. Solid Stat.Chem., 171(1-2), 12(2003)

[13] G.Yao, L.B.Su, X.D.Xu, J.Xu, Eu:Y2O3 nano-phosphor prepared by novel energy-saving solution combustion method, J.Alloy and Comp., 462(1-2), 381(2008)

[14] T.Kim, S.Kang, Hydrothermal synthesis and photoluminescence properties of nano-crystaline GdBO3:Eu3+ phosphor, Mater. Res. Bull., 40, 1945(2005)

[15] Y.H.Wang, C.F.Wu, J.C.Zhang, Hydrothermal synthesis and photoluminescence of novel green-emitting phosphor Y1−xBO3:xTb3+, Mater. Res.Bull., 41(8), 1571(2006)

[16] B.Yan, J.F.Gu, Controlled chemical co-precipitation and solid phase synthesis, microstructure and photoluminescence of La3PO7:Eu3+ phosphors, J.Non-crystalline Solids, 355, 826(2009)

[17] Y.S.Chang, F.M.Huang, Y.Y.Tsai, L.G.Teoh, Synthesis and photoluminescent properties of YVO4:Eu3+ nanocrystal phosphor prepared by pechini process, J.Lumin., 129(10), 1181(2009)

[18] R.Kijkowska, E.Cholewka, B.Duszak, X-ray diffraction and Ir-absorption characteristics of lanthanide orthophosphates obtained by crystallization from phosphoric acid solution, J. Mater. Sci., 38(2), 223(2003)

[19] GUANG Shanyi, ZHANG Chao, XU Hongyao, WANG Haiyan, LIN Naibao, Nano Y2−xSiO5Eu3+: preparation, structure effect on emitting propreties, emitting

mechanism, Chinese Journal of Inorganic Chemistry, 23(6), 999(2007)

[20] YUE Tao, ZHU Lixia, GAO Shiyang, XIA Shuping, Hydrothermal synthesis, FTIR and Raman spectra characterization of magnesium oxysulfate, Spectroscopy and Spectral Analysis, 23(6), 1115(2003)

[21] C.Y.Shang, X.H.Shang, Y.Q.Qu, M.C.Li, Quenching mechanisms of the optical centers in Eu3+-doped nanophosphors under charge transfer excitation, J. Appl. Phys., 108, 94328(2010)

[22] B.Moine, G.Bizarri, Why the quest of new rare earth doped phosphors deserves to go on, Opt. Mater., 28(1-2), 58(2006)

[23] A.N.Belsky, J.C.Krupa, Luminescence excitation mechanisms of rare earth doped phosphors in the VUV range, Display, 19(4), 185(1999)

[24] M.H.Modi, G.S.Lodha, P.Srivastava, A.K.Sinha, R.V.Nadeckar, Network compaction and surface deformation in the hydrogenated silicon nitride film upon soft X-ray/VUV illumination, Phys. Rev. B, 74(4), 45326(2006)

[25] M.A.Terekhin, A.N.Vasil’ev, M.Kamada, E.Nakamura, S.Kubota, Effect of quenching processes on the decay of fast luminescence from barium fluoride excited by VUV synchrotron radiation, Phys. Rev. B, 52(5), 3117(1995)

本刊中的类似文章

1．王珉 赵军 艾兴 刘继刚.含有烧结助剂的复相陶瓷材料烧结过程的元胞自动机模拟[J]. 材料研究学报, 2011,25(6): 618-624

2．檀雨默 张爱波 郑亚萍 兰岚 陈伟.具有固--液转变的磁性Fe_3O_4纳米流体的制备、结构及性能[J]. 材料研究学报, 2011,25(6): 561-565

3．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

4．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

5．吴宏伟 史铁钧 谭德新.Fe_2O_3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

6．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

7．奚小网 胡林华 刘伟庆 戴松元.基于4--叔丁基吡啶的染料敏化太阳电池中电子传输研究[J]. 材料研究学报, 2011,25(6): 613-617

8．董红周 董立峰.单壁碳纳米管负载Pt基二元金属催化剂对甲醇和乙醇氧化的电催化性能研究[J]. 材料研究学报, 2011,25(6): 579-584

9．高勇 徐兴祥 杨振明 张劲松.TiC/Ti_3SiC_2泡沫陶瓷的制备和性能[J]. 材料研究学报, 2011,25(5): 539-544

10．潘会 王君霞 孟大维 程明 王永钱 刘晓旸.Ce改性$S_2O^{2-}_8$/Al--Zn--O固体酸的制备和催化性能[J]. 材料研究学报, 2011,25(5): 522-526