无机材料学报 2007 22 (5): 803-806 ISSN: 1000-324X CN: 31-1363/TQ

溶胶-冷冻法制备纳米$Gd_2O_3:Eu^{3+}$发光材料

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收稿日期 2006-9-15 修回日期 2006-11-13 网络版发布日期 2007-8-25 接受日期

摘要 采用溶胶-冷冻法合成了粒径为20nm左右的近似于球形的$Gd_2O_3:Eu^{3+}$发光材料. XRD和FTIR分析表明: 所合成的前驱体样品为带有结晶水的晶态氢氧化物, 经过热处理后得到了立方相的Gd_2O_3. 荧光光谱测试表明: 所合成的样品具有良好的Eu^{3+}特征红光发射, Gd^{3+}到Eu^{3+}之间具有有效的能量传递过程. 随着灼烧温度的升高, 发射峰和激发峰的强度有所增强, 荧光寿命变长, 这是由于热处理温度升高, 晶体生长变好, 表面缺陷减少, 使表面的猝灭中心减少, 从而提高了荧光强度和荧光寿命.

关键词 溶胶-冷冻法 $Gd_2O_3:Eu^{3+}$; 发光材料 发光性能

分类号 0614

$Gd_2O_3:Eu^{3+}$ Luminescent Nano-materials Prepared by Sol-lyophilization Method

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Abstract $Gd_2O_3:Eu^{3+}$ luminescent materials with spherical shape and the size of 20nm were synthesized by a sol-lyophilization method. The XRD patterns and FTIR spectra show that the precursor samples are hydroxide crystals, and the calcined samples are cubic Gd_2O_3. The PL spectra show that the calcined samples emit Eu^{3+} character red light, and there is efficient energy transition from Gd^{3+} to Eu^{3+}. With the increasing of calcining temperatures, the intensity of emission and excitation increases and the lifetime becomes longer due to the crystal growing better, and the surface defects are decreased, then the quenching center is also decreased.

Key words sol-lyophilization method $Gd_2O_3:Eu^{3+}$; luminescent materials luminescent properties

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