Science and Technology of Advanced Materials

Synthesis of $Y_2O_2S:Eu^{3+}$, Mg^{2+}, Ti^{4+} hollow microspheres via homogeneous precipitation route

Author Peng-Fei Ai, Ying-Liang Liu, Li-Yuan Xiao, Hou-Jin Wang and Jian-Xin Meng

Affiliations Department of Chemistry, Jinan University, Guangzhou 510632, People's Republic of China

E-mail tliuyl@jnu.edu.cn

Journal Science and Technology of Advanced Materials Create an alert RSS this journal

Issue Volume 11, Number 3

Citation Peng-Fei Ai *et al* 2010 *Sci. Technol. Adv. Mater.* **11** 035002

doi: 10.1088/1468-6996/11/3/035002

Abstract A phosphorescent material in the form of $Y_2O_2S:Eu^{3+}$, Mg^{2+}, Ti^{4+} hollow microspheres was prepared by homogeneous precipitation using monodispersed carbon spheres as hard templates. $Y_2O_3:Eu^{3+}$ hollow microspheres were first synthesized to serve as the precursor. $Y_2O_2S:Eu^{3+}$, Mg^{2+}, Ti^{4+} powders were obtained by calcinating the precursor in a CS_2 atmosphere. The crystal structure, morphology and optical properties of the composites were characterized. X-ray diffraction measurements confirmed the purity of the Y_2O_2S phase. Electron microscopy observations revealed that the $Y_2O_2S:Eu^{3+}$, Mg^{2+}, Ti^{4+} particles inherited the hollow spherical shape from the precursor after being calcined in a CS_2 atmosphere and that they had a diameter of 350–450 nm and a wall thickness of about 50–80 nm. After ultraviolet radiation at 265 or 325 nm for 5 min, the particles emitted strong red long-lifetime phosphorescence originating from Eu^{3+} ions. This phosphorescence is associated with the trapping of charge carriers by Ti^{4+} and Mg^{2+} ions.

PACS
81.20.Fw Sol-gel processing, precipitation
78.55.Hx Other solid inorganic materials
81.40.Gh Other heat and thermomechanical treatments
72.20.Jv Charge carriers: generation, recombination, lifetime, and trapping
61.66.Fn Inorganic compounds
72.80.Ga Transition-metal compounds

Subjects
Condensed matter: electrical, magnetic and optical
Semiconductors
Condensed matter: structural, mechanical & thermal

Dates
Issue 3 (June 2010)
Received 15 十二月 2009 , accepted for publication 18 四月 2010
Published 24 六月 2010

Your last 10 viewed

1. Synthesis of $Y_2O_2S:Eu^{3+}$, Mg^{2+}, Ti^{4+} hollow microspheres via homogeneous precipitation route
   Peng-Fei Ai *et al* 2010 *Sci. Technol. Adv. Mater.* **11** 035002
2. *In vitro* formation and thermal transition of novel hybrid fibrils from type I fish scale collagen and type I porcine collagen
   Song Chen *et al* 2010 *Sci. Technol. Adv. Mater.* **11** 035001
3. Water distribution at solid/liquid interfaces visualized by frequency modulation atomic force microscop