Program - Symposium RR: Lanthanide Nanomaterials for Imaging, Sensing, and Optoelectronics

2013 MRS Spring Meeting & Exhibit

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2013-04-02

Symposium RR

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Symposium Organizers

- Hongshan He, South Dakota State University
- Zhong-Ning Chen, CAS, Fujian Institute of Research on the Structure of Matter
- Neil Robertson, The University of Edinburgh

RR1: Lanthanide Nanomaterials I

- Chair: Hongshan He
- Chair: Neil Robertson
- Tuesday AM, April 2, 2013
- Westin, 2nd Floor, Concordia

9:00 AM -

*RR1.01 ABSTRACT WITHDRAWN

mixture of reactants is mechanically activated by hand mixing in alumina mortar. After being exposed to air for 3h the mixture is washed in centrifuge with distilled water and ethanol and dried for 12h at 70°C. Series of samples are prepared with calcinations on different temperatures (600°C, 800°C and 1100°C) and also with different Yb3+-Er3+ ratios (10:1, 5:1 and 2:1).Particle size and crystallite size of powders obtained at different calcinations temperatures are evaluated through X-ray diffraction analysis and transmission electron microscopy.In all samples up-conversion emissions and corresponding lifetimes are measured after excitation at 978 nm in the wide temperature range (10-300 K). The most intense emission originate from the following Er3+ transitions: [2H9/2→4I15/2] in blue (407-420 nm); [2H11/2, 4S3/2) → 4I15/2] green: 510-590 nm; and [4F9/2→4I15/2] in red (640-720 nm) spectral region.We showed that ratio of red to green emissions may be tuned with Yb3+-Er3+ dopant ratio and that intensity of up-conversion emissions and lifetimes are strongly influenced by powder particle size and crystallinity.

8:35 PM - RR3.06

Thermographic Properties of Up-conversion Emission of Y2O3:Yb, Er Nanophosphors Obtained through Hydrothermal Synthesis

Mina Medic1, Marko Nikolic1, Vesna Lojpur1, Lidija Mancic2, Olivera Milosevic2, Miroslav Dramicanin1.

Hide Abstract

Thermographic phosphors are oxides doped with rare-earth or transition metal ions that will emit visible, infrared, or UV light upon excitation from an external energy source. This materials have received significant attention due to the potential application as optical temperature sensor. In this report, we have investigated yttrium oxide co-doped with changeable ytterbium to erbium ratio (Y1.94Yb0.05Er0.01 and Y1.97Yb0.02Er0.01) fabricated through hydrothermal synthesis. Process conditions (2h, 200 °C) and additional thermal treatment (3h, 1100 °C) allows obtaining nanoparticles of appropriate composition and morphology which further affect on improved photoluminescent characteristics. The fluorescence intensity ratio (FIR) technique is used to examine potential usage of samples as low temperature sensors.This optical method is based on ratio between two emission lines or areas in photoluminescence spectrum which show temperature dependence. Photoluminescent measurements (PL) are recorded in the temperature range from 10 K to 300 K under 978 nm exciting wavelength observing changes in following transitions: blue 2H9/2→4I15/2, green (2H11/2, 4S3/2) → 4I15/2 and red 4F9/2→4I15/2. Obtained experimental results implay that the fluorescent intensity ratio of the blue, green and red lines and areas show significant temperature sensitivity and can be used as low temperature sensor.

8:42 PM - RR3.07

Nanoorganized Polarized Media and Hybrid Luminescent Mesoporous Materials Based on Lanthanide-containing Lyotropic Mesogens

Natalia Michailonva Selivanova1, Yury Galyametdinov1.

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8:49 PM - RR3.08

Calculation of Judd-Ofelt Parameters of Er3+: NaYF4 from the Emission Branching Ratios

Ge Yao1, Cuikun Lin1, Mary Berry1, Stanley May1.

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8:56 PM - RR3.09

Fixed-component Lanthanide Hybrid Fabricated Full-color Photoluminescent Films as Vapoluminescent Sensors

Yu Tang1, Jun Xu1.

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