

Changes in luminescence properties of europium ions doped in SrF₂ nano particles reduced by thermal carbon reducing atmosphere

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Luminescence properties of SrF₂:Eu (1 mole%) nano powder were investigated by laser excitation spectroscopy. The laser excitations were performed by third harmonic 355 nm pulsed Nd:YAG laser dye laser pumped by second harmonic 532 nm laser. SrF₂:Eu nano powders were prepared by thermal-decomposition method at 350 °C for 2hrs. Trivalent europium ions in SrF₂ nano powders were reduced by thermal carbon reducing atmosphere (TCRA) at different temperature. The broad emission band of divalent europium ions peaking at around 420 nm and sharp emission lines of trivalent europium ions at 528, 573, and 619 nm are observed in the temperature range 15 K – room temperature. The decay of the 619 nm emission line shows single exponential behavior expect for initial state in which fast decay appears. The decays of the luminescence at 572 nm exhibit rise time behavior in the initial state and shows exponential behaviors in the late time region. The spectroscopic results indicate that the trivalent europium ions changes to the divalent europium ions by thermal carbon reducing atmosphere. In this presentation, we discuss the laser spectroscopic results in relation with the thermal reducing condition of the samples and crystalline size effect on the nano SrF₂:Eu particles.