SYNTHESIS AND LUMINESCENT PROPERTIES OF EU-DOPED STRONTIUM CHLORAPATITE

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Optical materials with adjustable luminescence attract a lot of attention due to their broad application possibilities. Most commonly Eu^{2+}-doped materials are synthesized in reducing atmosphere; nevertheless, some specific inorganic matrices allow for the stabilization of Eu^{2+} oxidation state in air atmosphere. Self-reduction phenomenon is known for the materials such as borates, silicates and phosphates. Overall, phosphate matrices are widely employed for the preparation of lanthanide-activated phosphors. One of the promising hosts is strontium chlorapatite ($Sr_5(PO_4)_3Cl$). This matrix is able to adopt a variety of isovalent and aliovalent ions including lanthanides.

In this work, Eu-doped $Sr_5(PO_4)_3Cl$ powders with various Eu content were synthesized and analyzed. The optimization of synthesis conditions in terms of temperature, time, precursor-to-flux ratio and Eu concentration was performed. Phase purity and crystal structure of synthesized products were studied by powder X-ray diffraction (XRD) and Fourier-transform infrared spectroscopy (FTIR). Morphological properties were investigated using scanning electron microscopy (SEM). Luminescent properties were investigated by means of photoluminescence measurements. Excitation and emission spectra of the samples were studied. Temperature-dependent photoluminescence measurements were performed as well.