Nano-crystalline Nd^{3+}-doped $LuPO_4$ optical materials obtained by ionic liquid assisted synthesis route

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Streszczenie

$LuPO_4$ in the form of nano-powders can find potential application in bio-imaging and luminescence thermometry. To enable development of functional materials there is a need to acquire basic information about the effect of morphology and grain size on spectroscopic properties. So, we investigated a series of Nd^{3+}-doped $LuPO_4$ nanoparticles prepared with task-specific ionic liquid as the reactant and in-situ stabilizer. Thus, fast and facile preparation of the desired well-crystallized single-phase phosphate nanomaterials was possible. The XRD patterns and TEM analysis revealed the influence of the synthesis conditions on the morphology and nanoparticles size, which is reflected in their spectroscopic properties. Low-temperature high-resolution techniques *i.e.* absorption spectroscopy at 4.2 K and laser site-selective spectroscopy at 77 K with Nd^{3+} ion as structural probe were used. Micro-powdered Nd^{3+}-doped $LuPO_4$ obtained by a solid-state reaction was applied as a reference. The possible application of this material as an optical thermometer was considered.

Słowa kluczowe

Ionic liquid assisted synthesis, Lutetium orthophosphates, Nd3+ dopant, Nano-powders, NIR emitting optical materials, thermometry

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