



The effect of Gd^{3+} doping on luminescence properties of (Gd, Ce): SrF_2 nanopowders and transparent ceramics.

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Streszczenie

The effect of doping of Gd^{3+} ions into Ce: SrF_2 on luminescence properties was investigated in (Gd, Ce): SrF_2 nanoparticle powders synthesized via the co-precipitation method, which contained fixed amount of Ce^{3+} ions and variable amounts of Gd^{3+} ions. (Gd, Ce): SrF_2 nanoparticle powders showed UV range emissions under $\lambda_{ex} = 273$ nm and $\lambda_{ex} = 298$ nm excitation. Photoluminescence emission, excitation, and lifetime measurements revealed the existence of $Ce^{3+} \rightarrow Gd^{3+}$ radiative energy transfer and provided evidence to the prevailing effect of Ce^{3+} in excitation and emission in the (Gd, Ce) co-doped system due to the existence of fully allowed 4f-5d transitions. The presence of Gd^{3+} was shown to affect the crystal field and symmetry around Ce^{3+} ions and enhances the absorption efficiency by two-fold. Furthermore, (Gd, Ce): SrF_2 transparent ceramics with 13.2% of in-line optical transmittance in the UV spectral range was obtained via the vacuum hot-pressing method. The increase in the UV luminescence emission intensity of Ce^{3+} in presence of Gd^{3+} , as well as the ability to process (Gd, Ce): SrF_2 as transparent ceramics, are what make (Gd, Ce): SrF_2 a promising material for optical applications in the UV region.

Słowa kluczowe

Transparent ceramics, UV emission, Radiative energy transfer

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