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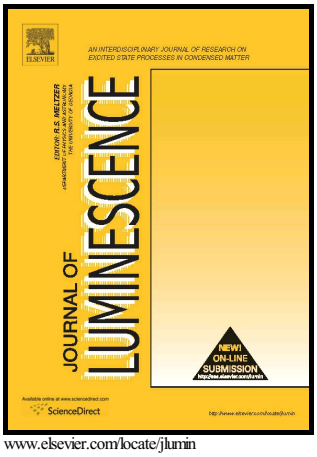

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Emission of white-light in cubic $Y_4Zr_3O_{12}$:Yb^{3+} induced by a continuous infrared laser.

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Abstract

In this work nanostructured powders with nominal composition $Y_4Zr_3O_{12}$, undoped and doped at Yb^{3+} 1 mol%, were synthesized by the polymerizable complex method. The crystal structure, microstructure and performance to produce white-light continuous emission spectra of powders under 975 nm continuous laser irradiation were investigated by X-ray diffraction (XRD), scanning electron microscopy (SEM), high resolution transmission electron microscopy (HRTEM), and optical spectroscopy. Continuous emission spectra of white-light were well-fitted by Planck's law of blackbody radiation. The threshold power values for generating white-light in sample annealed at 800 °C and 1100 °C were 1.36 W and 1.75 W, respectively. This difference was attributed to the crystallite size. The dependence of the absolute temperature, obtained from Planck's law fittings, as a function of the laser's power is explained as due to the microstructural changes, verified by XRD measurements. Finally, a stimulating mechanism of white-light generation involving non-radiative processes of Yb^{3+} is suggested.

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