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Structural and Luminescent properties of CsVO₃:Nd³⁺

This work studied the structural and luminescent properties of CsVO₃ crystals synthesised by the State Solid Reaction doped with Nd³⁺ ion (0.5, 1, 1.5, 3, 4.5 and 6 mol%). The State Solid Reaction is a versatile and eco-friendly technique potentially applicable in the industry. The X-Ray Diffraction patterns shows that the crystalline structure is the characteristic of the CsVO₃, the incorporation of the Nd³⁺ ion causes the structure to be modified. The excitation spectra of CsVO₃:Nd³⁺ (from 200 nm to 400 nm) show that the band has the maximum at 323 nm, this absorption band corresponding to 1A₁ → 1T₂ transition associated to [VO₄]³⁻. While the emission spectra from 400 nm to 800 nm, show that the band has the maximum at 535 nm, the band emission in the PL spectra is made up of 3T₁ → 1A₁ (548 nm) and 3T₂ → 1A₁ (486 nm) transitions. The Near-Infra Red (NIR) emission of CsVO₃:Nd³⁺ was obtained excited at 808 nm with a pumping power around 370 mW, the maximum in the emission band at 1063 nm corresponding to 4F_{3/2} → 4I_{11/2} transition of the Nd³⁺. Near-infrared photoluminescence is useful for applications in optoelectronics and photovoltaics and for such purposes CsVO₃:Nd³⁺ is very promising.

Keywords

Photoluminescence, Cesium vanadate, State solid reaction, Neodymium, Crystalline structure.

Reference

T. Sun, A.H. Li, C. Xu, Y.H. Xu, R. Wang, Energy transfer properties of Nd³⁺ → Yb³⁺ in Nd:Yb:LiNbO₃ crystals, Opt. Laser Technol. 56 (2014) 322–325. <https://doi.org/10.1016/j.optlastec.2013.09.010>.

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Author approval

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