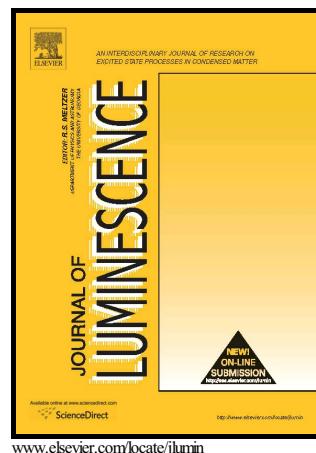


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Europium doping in monoclinic KYb(WO₄)₂ crystal

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Abstract

We report on a detailed spectroscopic study of Eu³⁺ ions in the monoclinic KYb(WO₄)₂ crystal. The polarized room and low-temperature absorption spectra are measured. The maximum σ_{abs} corresponding to the $^7F_1 \rightarrow ^5D_1$ transition is $1.32 \times 10^{-20} \text{ cm}^2$ at 534.2 nm with a bandwidth of 0.7 nm (for $E \parallel N_m$). The Stark sub-levels of the excited multiplets are determined. A Judd-Ofelt analysis is applied to the Eu^{3+>:KYb(WO₄)₂ crystal to determine the probability of spontaneous transitions, radiative lifetimes and luminescence branching ratios. Within the strong configuration interaction (SCI) approximation, the intensity parameters are $\Omega_2 = 4.757$, $\Omega_4 = 2.295$, $\Omega_6 = 1.644$ [10^{-20} cm^2] and $\Delta_f = 50160 \text{ cm}^{-1}$. The radiative lifetime of the 5D_0 state is 351 μs . The maximum stimulated-emission cross-section corresponding to the $^7F_1 \rightarrow ^5D_1$ transition is $1.44 \times 10^{-20} \text{ cm}^2$ at 703.2 nm (for $E \parallel N_m$). Under UV excitation, the Eu^{3+>: KYb(WO₄)₂ crystal provides intense red photoluminescence with CIE coordinates, $x = 0.675$, $y = 0.325$.}}

Keywords: double tungstates, europium, absorption, luminescence.

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