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Optical and structural investigation of dysprosium doped-$Y_2Te_4O_{11}$.

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Streszczenie

In this paper, the optical properties of $Y_2Te_4O_{11}$microcrystalline powders doped with Dy^{3+}ions, ranging between 0.01 and 5.0at%, are reported. The powders were successfully synthesized by the solid state reaction method. Absorption (300K), excitation (300K) and fluorescence spectra (at 11.6 and 300K) as well as fluorescence decay curves recorded at room temperature are presented and analyzed in details. Oscillator strengths, phenomenological$\Omega_\lambda(\lambda=2,\ 4,\ 6)$ Judd-Ofelt parameters, radiative transition probabilities, branching ratios, the radiative lifetime of the$^4F_{9/2}$level as well as the stimulated emission cross-section for the$^4F_{9/2}\rightarrow{}^6H_{13/2}$transition have been determined. The observed non-exponential decay nature and concentration quenching of the$^4F_{9/2}$emitting level of the Dy^{3+}ion, have been attributed to cross-relaxation processes. The high value of the stimulated emission cross-section for the$^4F_{9/2}\rightarrow{}^6H_{13/2}$transition at 576.6nm, equal to $0.756\times10^{-20}cm^2$, indicates that $Y_2Te_4O_{11}$activated by trivalent dysprosium ions is an attractive candidate for a solid-sate laser.

Słowa kluczowe

oxotellurates, Dy3+ ion, luminescence, Emission cross section, laser materials

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