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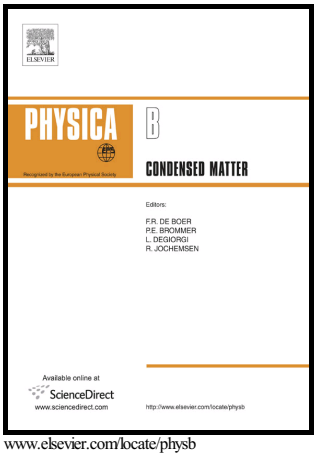

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Structural and photoluminescence properties of Yb/Tm co-implanted ZnO crystals

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Abstract

ZnO virgin crystals were implanted with keV Yb and Tm ions at a total fluence of ~10^{15} ions/cm^2 at 600 °C. Thermal annealing was performed at 800 °C for 30 min in oxygen ambient. The effects of ion irradiation on the structural properties of the crystals were investigated using Rutherford backscattering/channeling and high-resolution X-ray diffraction technique. Near-infrared and upconversion luminescence emissions were demonstrated under excitation with 532 and 980 nm lasers, respectively. Results showed that the upconversion fluorescence spectra consisted of two emission peaks at around 484 and 673 nm, which were assigned to the Tm^{3+}:$^1G_4 \rightarrow {}^3H_6$ and Tm^{3+}:$^1G_4 \rightarrow {}^3F_4$ transitions, respectively.

Keywords:

Ion implantation; Rare-earth-doped materials; Photoluminescence; ZnO