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Pump saturation effect of the $\text{Er}^{3+}/\text{Yb}^{3+}$ co-doped $\text{Y}_2\text{Ti}_2\text{O}_7$ phosphors containing nanocrystals¹ FENG SONG, FENGXIAO WANG, JUN ZHANG, GUI-YANG CHEN, MING FENG, School of physics, Nankai University — Er^{3+} and Yb^{3+} co-doped $\text{Y}_2\text{Ti}_2\text{O}_7$ phosphors containing nanocrystals were prepared by sol-gel method and annealed at 800 °C for 1 h in air. The X-ray diffraction (XRD) and transmission electron microscope (TEM) images showed that the mean size of nano-crystals is about 40-50nm, which corresponds well with the calculated results by Scherrer equation. Photoluminescence spectra and its upconversion properties were investigated. The anomalous slopes of the fitted line in the log-log plots for upconversion emissions and the pump-saturation effect of near infrared (NIR) emission were observed in the nanocrystalline samples. The reasons for the highly efficient upconversion luminescence and pump-saturation effect of NIR emission were discussed by a theoretical model of practical $\text{Er}^{3+}/\text{Yb}^{3+}$ co-doped system based on the rate equations.

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