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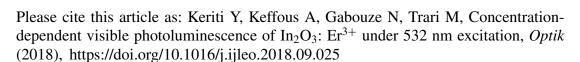
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ACCEPTED MANUSCRIPT

Concentration-dependent visible photoluminescence of In_2O_3 : Er^{3+} under 532 nm excitation

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Abstract

In₂O₃ thin films were doped with Er^{3+} at different concentrations (0.5 - 2%) by sol-gel method and annealed at 1000 °C. The In₂O₃: Er^{3+} films were characterized by X-ray diffraction, atomic force microscopy, scanning electron microscopy, X-ray photoelectron spectroscopy, photoluminescence (PL) and ellipsometry. The films are polycrystalline with a cubic structure related to In₂O₃. The trivalent state of Erbium in the In₂O₃ crystal is confirmed by photo electron spectroscopy. Doped films were excited under selective Er^{3+} excitation at 532 nm; the visible Er^{3+} -related emission is observed in the photoluminescence spectra and the major emissions occur in the green region with strongest lines at 548 and 567 nm. They are mainly produced by the Stark split $^2H_{11/2}$ and $^4S_{3/2}$ transitions to $^4I_{15/2}$ ground state and highest emission is observed on In₂O₃: 1% Er^{3+} .

Keywords: In₂O₃ thin films; Sol-Gel; Rare earth; Photoluminescence; Er³⁺-related emission; Structural properties.

1. Introduction

 In_2O_3 thin films has attracted a great interest as wide band gap semiconductor (~ 3.7 eV) because of the high optical transmission in the visible region (> 80%) [1]. Therefore, In_2O_3 can be used in many fields such as solar cells, light emitting diodes, memory storage devices

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