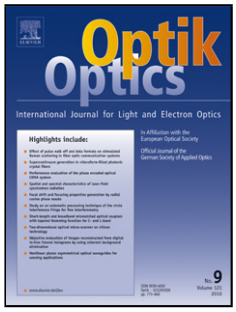

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Near-Infrared-to-Visible Upconverting Luminescence of Er^{3+}-doped CdSe nanocrystals grown by chemical bath

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Abstract

CdSe thin films were prepared by chemical bath and doped *in situ* with Er^{3+} ions. Three impurity levels were prepared by changing the relative volume of the salt solution containing Er^{3+} ions in the CdSe growing solution. Changes in the grain size (~5.5-3.5 nm) and band gap energy (~1.80-2.25 eV) were observed in the undoped and doped CdSe films, respectively. Photoluminescence studies displayed room temperature emission exhibiting NIR-to visible upconversion. The transition bands $^4I_{13/2}\rightarrow{}^4I_{15/2}$, $^2I_{9/2}\rightarrow{}^4I_{15/2}$ and $^2F_{9/2}\rightarrow{}^4F_{15/2}$ in the ~700-850 nm region were investigated. Upconversion emissions were observed from the CdSeEr sample under light excitation (325 nm). The upconversion emission intensity ratio of these transitions is attributed to the variation of the local structure around Er^{3+} ions. These results confirm that visible upconversion emissions of Er^{3+} in the CdSeEr nanocrystals are mainly produced via two-photon excited-state absorption and energy transfer upconversion processes.

***Keywords*:** Thin films; ; ; ; , cell potential, nanoparticles, coordination complex, doping.

1. Introduction

CdSe is a semiconductor of the II-VI compound family which has a great potential in applications such as solar cells [1], thermodynamic and electronic devices [2],