Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Enhanced 1540 nm emission from ZnO:Er nanorod arrays via Ag island films JIANG-WEI LO, CHIN-AN LIN, JR-HAU HE, Natl Taiwan Univ — Self-assembled nanorod arrays (NRAs) heterostructures that consist of a single-crystalline Er-doped ZnO NRAs grown on Ag nanodot films have been synthesized by a chemical method and proposed as one of the promising optoelectronic materials since the Er intra-4f shell transition leads to 1540 nm emission for optical communication. The enhancement of 1540-nm emission of Er-doped ZnO NRAs via enhanced deep level emission of ZnO host resulted from local field enhancement effects of Ag nanodot films, and subsequent energy transfer to Er^{3+} has been demonstrated. The microstructural analysis, electronic structure analysis, and photoluminescence characterizations have been performed to clarify the mechanism of enhanced 1540 nm emission. This paves the way to electrical pumping in a nano-system that forms NRAs of high-quality optical cavity.

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Date submitted: 21 Nov 2008 Electronic form version 1.4