



Contribution ID: 115

Type: Oral Presentation

Effect of annealing on the photoluminescence characteristics of solution grown ZnO nanorods array

Tuesday, 8 July 2014 10:00 (20 minutes)

Abstract content
 (Max 300 words)
 http://events.saip.org.za/getFile.py/?target=_blank
 Formatting & Special chars

Abstract

The effect of annealing in oxygen and nitrogen on the luminescent properties of ZnO nanorods grown by Chemical Bath Deposition (CBD) has been studied. Special emphasis was given to the visible part of the spectrum. X-Ray Diffraction (XRD) and Scanning Electron Microscopy (SEM) analysis reveal that the as-grown nanorods are well aligned, have good crystalline quality and are orientated along the c-axis. The photoluminescence (PL) spectra of the as-grown ZnO nanorods show strong near band edge (NBE) excitonic emission and weak visible deep-level emission (DLE), which indicate good optical properties and very few structural defects. However, after a sequential annealing of the nanorods in oxygen and nitrogen, the PL spectra reveal DLE that extends into the near infrared (out to ~950 nm).

The analysed XRD spectrum shows only the [0002] reflection, which indicates a preferred orientation of the nanorods with the c-axis perpendicular to the substrate. The SEM image confirms this. Based on annealing studies in different environments and annealing temperatures (from 200 to 800 °C), three possible DLE transition lines are deduced. More details on the effects of annealing on the photoluminescence characteristics of solution grown ZnO nanorod arrays on the DLE will be discussed.

Apply to be considered for a student award (Yes / No)?

Yes

Level for award (Hons, MSc, PhD)?

MSc

Main supervisor (name and email) and his / her institution

Prof J. R. Botha, Reinhardt.Botha@nmmu.ac.za, Nelson Mandela Metropolitan University

Would you like to submit a short paper for the Conference Proceedings (Yes / No)?

No

Primary author: Mr MBULANGA, Crispin (Nelson Mandela Metropolitan University)

Co-authors: Prof. BOTHA, Reinhardt (NMMU); Mr TANKIO DJIOKAP, Stive Roussele (NMMU); Dr URGESSA, Zelalem (NMMU)

Presenter: Mr MBULANGA, Crispin (Nelson Mandela Metropolitan University)

Session Classification: Photonics

Track Classification: Track C - Photonics