Contribution ID: **202** Type: **Poster Presentation**

Spectroscopy of trivalent neodymium ions (Nd3+) in zinc oxide (ZnO) powders and thin films.

Thursday, 28 June 2018 15:00 (2 hours)

Zinc oxide is a wide band-gap semiconductor that is considered a good host for rare-earth ions. Nd3+ ions doped into ZnO cause variations to the broad emission band that arises from the intrinsic vacancy, antisite and interstitial defects. The Nd3+ ions give rise to narrow and discrete absorption and emission bands superposed on the broad band. Most of the ZnO:Nd3+ emission reported in the literature was obtained using UV excitations and with the sample at 300 K. The results presented here were obtained from spectroscopic studies of ZnO:1mol%Nd:10mol%Li annealed powders (in pellet form) and ZnO:3mol%Nd as-deposited films conducted at 10 K. Argon ion laser lines in the 457 – 515 nm wavelength range were used for excitation. Both the powders and the films yielded the broad emission band characteristics of intrinsic ZnO defects as well as sharp emission transitions characteristic of Nd3+ ions. The Nd3+ emission occurs in the 895 to 905 nm wavelength range and is attributed to the 4F3/2 ⟶ 4I9/2 transitions. This near-infrared Nd3+ emission has found uses in bio-imaging and colored-light emission while the re-absorption is used to block the yellow-flame glow on welding goggles. In addition, several Nd3+ re-absorption bands were superposed on the broad emission for the powder samples. Doped pellets have potential use as cost-effective targets for thin-film deposition by the pulsed laser technique.

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