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Tunable UV-Luminescent MgZnO Nanoalloys JOHN L. MORRISON, JESSE HUSO, HEATHER HOECK, ERIN CASY, JAMES MITCHELL, RUSSELL GEISTHARDTAND, LEAH BERGMAN, University of Idaho, Department of Physics — Mg(x)Zn(1-x)O alloys are promising wide-bandgap semiconductors for optoelectronic applications, and also of considerable interest from a fundamental viewpoint. The environmentally friendly chemical composition and the deep excitonic level $\sim$ 60 and 90 meV of ZnO and MgO respectively make it an excellent candidate for high-efficiency next generation ultraviolet light sources. These optical alloys may enable the tuning of the bandgap and the luminescence at the range of $\sim$ 3.0 for ZnO of the wurtzite structure up to $\sim$ 7 eV for the MgO of the rocksalt structure. We will present studies on the photoluminescence and Raman properties of Mg(x)Zn(1-x)O nanocrystallites of average size $\sim$ 30 nm that were synthesized via the thermal decomposition method. For the studied composition range of 0-26% Mg, the room temperature UV-PL was found to be tuned by $\sim$ 0.3 eV towards the UV-spectral range. For that composition range the first-order LO Raman mode was found to exhibit a significant blueshift of $\sim$ 33 cm^{-1} indicating that a good solid solution was achieved at the nanoscale. At higher composition ranges a PL blue shift of at least 1.3 eV was achieved. Issues such as excitonic emissions, alloy spectral broadening, and phonon symmetry will be presented

Leah Bergman
University of Idaho, Department of Physics

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