

Abstract Submitted
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Mg_xZn_{1-x}O metastable alloy films: growth and properties.¹ DINESH THAPA, Department of Physics, University of Idaho, JESSE HUSO, Department of Physics and Astronomy, Washington State University, JEFFREY LAPP, AMRAH CANUL, Department of Physics, University of Idaho, MATTHEW MCCLUSKEY, Department of Physics and Astronomy, Washington State University, LEAH BERGMAN, Department of Physics, University of Idaho — Mg_xZn_{1-x}O, where x is the composition, is a vital semiconductor alloy system that can span bandgaps in a deep UV range of 3.3 to 7.5 eV. The alloy films were grown far from thermodynamic equilibrium condition in a metastable state, thus knowledge of their thermal stability is a key issue for applications at elevated temperature. The thermal stability of the films was studied via post-growth annealing. Structural and optical properties of both as-grown and annealed films were studied using XRD and transmission spectroscopy. The as-grown films were found to exhibit a single wurtzite phase up to Mg composition x=0.57 and single cubic phase for x ≥ 0.75. However, the film for x = 0.68 was found to be in the mixed phase. The existence of single wurtzite phase as-grown films with high Mg composition is discussed in terms of the low growth temperature and small lattice constant of the wurtzite relative to the cubic structure. The annealing studies showed that single phase wurtzite films were thermally stable up to x = 0.25, while the annealed cubic films were stable for x ≥ 0.83.

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