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**Defect Dynamics and optical properties in ZnO films** DINESH THAPA, JESSE HUSO, HUI CHE, AMRAH CANUL, University of Idaho, JOHN MORRISON, Lewis-Clark State College, CALEB COROLEWSKI, M.D. MCCLUSKEY, Washington State University, LEAH BERGMAN, University of Idaho
— ZnO is an environmentally-friendly material with a wide range of applications in optoelectronic devices for which an enhanced UV photoluminescence (PL) of ZnO is a key feature. However, many as-grown films are observed to contain some intrinsic defects which can reduce the UV PL efficiency, limiting their practical usefulness. This study presents a route to achieve an enhanced UV PL from the sputtered film and examines the origin of the enhanced UV PL. As-grown films reveal a weak UV emission and a visible emission due to zinc interstitial (Zni) related defects. To understand the route toward enhanced UV PL, annealing was performed on two sets of as-grown films each separately under Ar and O2 atmospheres. The PL spectra of O2 annealed samples display an enhanced UV peak with elimination of the Zni related emission peak, however an Oi-related defect emission was introduced. In contrast, Ar annealed films showed a significantly enhanced UV PL with nearly quenched visible emission. The origin of enhanced UV PL was investigated via low temperature PL measurements which indicate that dominant emission in the UV region is related to structural defects. We acknowledge the US Department of Energy, Office of Basic Energy Science, Division of Materials Science and Engineering under Grant No. DE-FG02-07ER46386. J.H. who contributed to data interpretation acknowledges the National Science Foundation under Grant No. DMR 1202532.

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