

Abstract Submitted
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The origin of the UV Luminescence and its Enhancement in nanocrystalline ZnO film¹ DINESH THAPA, JESSE HUSO, HUI CHE, AMRAH CANUL, Department of Physics, University of Idaho, CALEB COROLEWSKI, M.D. MCCLUSKEY, Department of Physics, Washington State University, LEAH BERGMAN, Department of Physics, University of Idaho — ZnO is an excellent luminescent material in the UV range with a potentially wide range of applications. However, many as-grown films are observed to contain some intrinsic defects which can diminish UV-emission efficiency, limiting their practical usefulness. This study presents a route to enhance UV luminescence from ZnO sputtered films. The photoluminescence (PL) spectra of the as-grown film exhibits prominent visible PL attributed to zinc interstitial (Zn_i) related defects, and a weak UV PL peak. To understand the route toward enhanced UV PL, one set of as-grown films were annealed in O_2 atmosphere and another set in Ar atmosphere. PL spectra of O_2 -annealed samples revealed enhanced UV PL and elimination of the Zn_i -related defect emission, however, an O_2 -related defect emission was evolved. In contrast, Ar annealed films showed significantly enhanced UV emission with nearly completely quenched visible emissions. The origin of UV PL was studied by low temperature measurements which indicate that an emission related to structural defects is dominant in the UV region.

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