

Abstract Submitted
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Characterization of Epitaxial ZnO Films Grown Using Magnetron Sputtering¹ TOM ODER, BIJAYANDRA SHAKYA, Youngstown State University, DAVID LOOK, Wright State University, WIDE BANDGAP SEMICONDUCTOR LABORATORY TEAM, SEMICONDUCTOR RESEARCH CENTER TEAM — Zinc oxide has recently gained tremendous interest for the development of a wide range of devices for optoelectronic, electronic and spintronic applications. However, there is still difficulty in obtaining good quality p-type ZnO materials necessary in the development of these devices. We report the results of our studies on ZnO films that were sputter-deposited at 500 °C on various substrates using different gases. Post-deposition annealing up to 900 °C in N₂ resulted in films whose crystalline quality improved with the annealing temperature. Films grown on sapphire in a 1:1 Ar-O₂ mixture and annealed in N₂ at 900 °C for 5 min had the best quality. Low temperature photoluminescence measurements revealed lines from donor-bound excitons and defects in the materials. Blue emissions prominent in O₂-annealed samples possibly related to Zn-vacancies and their complexes were observed. The two-theta XRD measurements of these films showed a peak at 34.8°, which corresponds to the diffraction from the (0 0 2) plane of the ZnO and indicates a strong c-axis orientation perpendicular to the surface at the sapphire substrate.

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