

Abstract Submitted  
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**Effects of Deposition Parameters on the Properties of Single  
Crystal ZnO Films**<sup>1</sup> ANDREW SMITH, MICHAEL MCMASTER, NAGARAJU  
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— We present the results from investigation of the effects of deposition parameters on the properties of sputter-deposited ZnO films. The films were deposited on sapphire substrates using radio frequency magnetron sputtering from a high purity ZnO solid target. Parameters investigated were the substrate temperature during deposition, which was varied from 25 °C to 600 °C; the deposition gas pressure varied from 5 mTorr to 40 mTorr and the gas flow rate varied from 5 to 30 standard cubic centimeter per minute (sccm). After post-deposition annealing in N<sub>2</sub> at 900 °C for 5 min, the films were characterized using photoluminescence spectroscopy, X-ray diffraction (XRD) and Atomic force microscopy measurements. The optimum conditions consisted of heating the sapphire substrates in O<sub>2</sub> prior to deposition, and depositing the film at a substrate temperature of 300 °C, a gas pressure of 10 mTorr and a gas flow rate of 20 sccm. The near band edge luminescence spectra had peaks with narrow line widths as small as 8.59 meV and are attributed to radiative recombination of bound excitons. The XRD  $2\theta$ -scans had peaks at 34.4° with the best full-width-at-half-maximum value of 0.10°.

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