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Annealing Temperature Tuned Structural and Optical Properties of ZnO Sputtered Thin Films ARSHAD BHATTI, MADIHA SABEEN, MALIK ABDUL-REHMAN, MUHAMMAD BHOPAL, AWAIS ALI, FAISAL NASIM, COMSATS Institute of Information Technology, CMND TEAM — We report the role of annealing in oxygen environment on the structure and optical properties of zinc oxide (ZnO) thin films grown in oxygen deficient environment. Thin films of two different thicknesses (300 nm and 500 nm) were sputter deposited and annealed from 400 to 800 °C. X-ray diffraction showed better crystallinity of 500 nm thick films than 300 nm on annealing; however 300 nm films had grown in preferred orientation along the c-axis. The grain sizes increased from 0.1 to 0.45 μm from the as – grown to the annealed at 800 °C, respectively. Raman spectra showed blue shift in $E_2\text{High}$ and $3E_2\text{LO}$ modes with the increase in the annealing temperature attributed to the enhancement of oxygen vacancies. The A_1 (TA+TO) mode showed red shift due to reduction in structural and surface defects. Room temperature PL showed two bands corresponding to UV and visible were due to band edge emission and defect assisted luminescence and showed distinctively different behavior in the annealed films.

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