

Preparation and Characterization of ZnO Nano Films by Atomic Layer Deposition

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High quality ZnO films have important applications in short wavelength optical devices including light emitting diodes (LEDs) or laser diodes (LDs). In order to grow quality of ZnO films, the atomic layer deposition (ALD) technique was employed. The ZnO nano films were prepared on Si(100), Si(111) and sapphire by the ALD using diethylzinc and oxygen precursors. Finding the ALD process window was examined by changing the substrate temperature, the injection time and the flow rate of source gases, respectively. The structural and optical properties of ZnO nano films have been investigated by atomic force microscopy (AFM), X-ray diffractometer (XRD) and photoluminescence (PL). AFM images showed that the average grain size increases with temperature. Also the uniformity of grain size was excellent at 200°C. The XRD patterns showed that crystallinity of ZnO films deposited on sapphire was better than on Si(100). PL spectra showed a typical peak of ZnO films at 3.3eV, but its intensity was relatively weak because of a poor crystallinity by lattice mismatch.