

Structural and optical properties of ZnO nanoparticles grown by atomic layer deposition

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The high crystallinity and high density ZnO nanoparticles have been successfully grown over a Si(100) using 10 nm thin film of Au, which act as a catalyst, on the substrate by a novel atomic layer deposition (ALD) method at a low temperature (500°C) in which diethyl zinc and oxygen gas were used as a source of Zn and oxygen, respectively. The FESEM images of the grown nanoparticles shows that the average sizes of the particles are in the range of 10–30 nm. X-ray diffraction data shows that the grown structures are wurtzite hexagonal and preferentially oriented in the c-axis direction. Three peaks have been observed in the PL spectra, at 378nm, 520nm and 577nm assigned to be as UV emission and green emission (520nm and 577nm). The strong UV emission and weak green emission in the PL spectra shows that as grown, low temperature ZnO nanoparticles have a good crystal quality with very less oxygen vacancies.