

## Fabrication of ZnO Nanofilms Grown by Plasma Enhanced Atomic Layer Deposition: Structural, Optical and Electrical Properties

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A simple and modified plasma enhanced atomic layer deposition (PEALD) is used to deposit high-quality ZnO nanofilms at a low temperature by using diethyl zinc ( $\text{Zn}(\text{C}_2\text{H}_5)_2$ ) and oxygen ( $\text{O}_2$ ) as sources for zinc and oxygen, respectively with nitrogen ( $\text{N}_2$ ) purging gas. The films were grown at 220 °C and characterized in detail in terms of structural, optical and electrical properties. The as-grown ZnO nanofilms were single-crystalline with the wurtzite hexagonal phase and grown along the [0002] direction in preference. We observed that by increasing the R.F power from 0 to 150 W under oxygen discharges, the deposition rate increased from 0.98 to 3.19 nm/cycle. Only sharp and strong UV emission at 380 nm from room-temperature photoluminescence (PL) spectra were observed from all the as-grown ZnO nanofilms. In addition, it was observed that with increasing the R.F power under oxygen plasma, the resistance of the as-grown ZnO nanofilms increased. On the other hand, increasing the R.F power under oxygen plasma, the hall coefficient and mobility of the as-grown ZnO nanofilms decreased.