ZnO Nanofilms Grown by Plasma Enhanced Atomic Layer Deposition

김진환, 최한석, 한윤봉*
전북대학교
(ybhahn@jbnu.ac.kr*)

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 (Zn(C2H5)2) and oxygen (O2) as sources for zinc and oxygen, respectively with nitrogen (N2) purging gas. The films were grown at 220 ℃ 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 300 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.