

Atomic layer deposition of high quality ZnO films grown on homo buffer layer : structural and optical properties

이 석, 임용환, Umar Ahmad, 김상훈, 한윤봉*
전북대학교
(ybhahn@chonbuk.ac.kr*)

A two-step growth process to grow the high-quality ZnO films with various thicknesses of homo buffer layers deposited on Si<111>substrate by the low temperature atomic layer deposition (ALD) process was proposed. The first step contains the growth of buffer layer while the main layer was deposited secondly at the temperature ranges between 130~320°C. The behaviors of growth rate (thickness/cycles) with DEZn pulse and oxygen pulse (time) have been explored to know the best ALD condition for the deposition of as-grown products. The detailed structural and optical properties of the ZnO films, deposited on ZnO-buffer/Si(111), were investigated as a function of buffer layer thickness. The crystallinity of the deposited ZnO films with various buffer layer thicknesses, observed by XRD patterns, indicated that the as-grown films are highly oriented in the c-axis and grown on [0001] direction. The photoluminescence properties of the deposited ZnO films showed a strong NBE emission at 380 nm and a weak green level emission at 520-570 nm, indicating the overall good crystallinity of the ZnO films deposited on a 33 nm buffer layer.