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PLD법으로 성장시킨 As 도핑된 ZnO 박막의 특성
Properties of As-doped ZnO films grown by pulsed laser deposition

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Investigations on the growth of ZnO has more recently regained because of its potential use in the UV or blue light emitting materials, transparent electronics, and surface acoustic wave devices. The notable properties of ZnO are its direct wide bandgap (3.37 eV) and large exciton binding energy (60 meV). While the fabrication of n-type ZnO is relatively easily realized via substituting Al, Ga or In on Zn site or by via oxygen vacancies, Zn interstitials, making reliable p-type ZnO is still remains elusive. The difficulty in obtaining p-type ZnO is attributed to self-compensation from native point defects (VO and Zni), possibly by hydrogen as an unintentional extrinsic donor or due to low solubility of the dopant. From the valence electron arguments, it is suggested that the group V elements are the possible acceptor dopants in ZnO.

In this work, we report the growth of As-doped ZnO films by a pulsed laser deposition technique. Arsenic doped ZnO thin films on sapphire substrate were grown at 600oC in the oxygen ambient. Results of x-ray diffraction showed that the films were grown with in-plane alignment as well as c-axis orientation. The surface morphological and optical properties of the As-doped films were examined by SEM and PL measurements, respectively. The existence of arsenic in the grown films was confirmed by x-ray photoelectron spectroscopy (XPS) analysis. For the I-V characteristics, various types of metallization process for forming ohmic contacts to the film have been used. The Hall measurements were carried out using four-point van der Pauw configuration in order to determine the electrical properties of the films and the results will be presented in detail.