

【N-15】

Nanoindentation studies of epitaxial ZnO thin films on (0001) sapphire substrates

Jun-Hee Hahn*, R. Navamathavan**, Kyoung-Kook Kim**, Dae-Kue Hwang** Seong-Ju Park**, Tae Geol Lee* and Gwang-Seok Kim***

*Chemical Metrology and Materials Evaluation Division, Korea Research Institute of Standards and Science, **Department of Materials Science and Engineering, Kwangju Institute of Science and Technology, ***Department of Materials Engineering, Hankuk Aviation University

Nanoindentation studies have been carried out on epitaxial ZnO thin films on (0001) sapphire substrates grown by rf magnetron sputtering technique. A single discontinuity (pop-in) in the load-indentation depth curve was observed at a specific depth (13~16 nm) irrespective of the film thickness. The physical mechanism responsible for the pop-in phenomenon was explained by the interaction of the deformed region, formed by an indentation tip, with the threading dislocation that existed in the ZnO thin films. Mechanical properties such as elastic modulus and hardness of the ZnO thin films were found to be 160 ± 10 GPa and 7.8 ± 0.4 GPa, respectively.