T2-P048

Growth of ZnTe Thin Films by Oxygen-plasma Assisted Pulsed Laser Deposition

Sang Woo Pak, Jooyoung Suh, Dong Uk Lee, Eun Kyu Kim

Quantum-Function Research Laboratory and Department of Physics, Hanyang University, Seoul 133-791, Korea

ZnTe semiconductor is very attractive materials for optoelectronic devices in the visible green spectral region because of it has direct bandgap of 2.26 eV. The prototypes of ZnTe light emitting diodes (LEDs) have been reported [1], showing that their green emission peak closely matches the most sensitive region of the human eye. Another application to photovoltaics proved that ZnTe is useful for the production of high-efficiency multi-junction solar cells [2,3]. By using the pulse laser deposition system, ZnTe thin films were deposited on ZnO thin layer, which is grown on (0001) Al_2O_3substrates. To produce the plasma plume from an ablated ZnO and ZnTe target, a pulsed (10 Hz) YGA:Nd laser with energy density of 95 mJ/cm^2 and wavelength of 266 nm by a nonlinear fourth harmonic generator was used. The laser spot focused on the surface of the ZnO and ZnTe target by using an optical lens was approximately 1 mm^2. The base pressure of the chamber was kept at a pressure around 10^{-6} Torr by using a turbo molecular pump. The oxygen gas flow was controlled around 3 sccm by using a mass flow controller system. During the ZnTe deposition, the substrate temperature was 400^{o}C and the ambient gas pressure was 10^{-2} Torr. The structural properties of the samples were analyzed by XRD measurement. The optical properties were investigated by using the photoluminescence spectra obtained with a 325 nm wavelength He-Cd laser. The film surface and carrier concentration were analyzed by an atomic force microscope and Hall measurement system.

Keywords: ZnTe, oxygen-plasma assisted PLD, Solar Cell