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Structural properties of ZnO thin films grown on glass substrate by pulsed laser deposition TOSHIHIKO MAEMOTO, HIROAKI ISHII, SHIGEHIKO SASA, MASATAKA INOUE, Nanomaterials Microdevices Research Center, Osaka Institute of Technology — High quality ZnO epitaxial films on Corning glass substrates were produced by pulsed laser ablation. These films were characterized by x-ray diffraction, optical transmittance, photoluminescence (PL), and Hall effect measurements. The high crack density that results from the mismatch of the thermal expansion coefficients between the ZnO film and glass substrate, make it difficult to grow ZnO films directly. In order to improve the quality of ZnO thin films grown on such a substrate, we introduced low-temperature grown ZnO (LT-ZnO) buffer layers between the films and the glass substrates. The surface of the ZnO films grown on the LT-ZnO buffer is very smooth, with a root-mean-square roughness of 1 nm. Highly c-axis oriented ZnO(0002) reflections corresponding to the wurtzite-phase were observed. Moreover, the LT-ZnO buffer layers affected the structural and optical properties of subsequently grown un-doped ZnO films. The full width at half maximum (FWHM) values of the PL spectra was reduced with increments in the buffer thickness. Details of the structural properties, optical properties, and electrical properties for the ZnO thin films grown on glass substrates will be discussed.

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