Characterization Of Defects In $\beta$-Ga$_2$O$_3$ Thin Film Grown By Metal Organic Chemical Vapor Deposition

ARMANDO HERNANDEZ, SAHIL AGARWAL, DAVID WINARSKI, POONEH SAADATKIA, FARIDA SELIM, BGSU — $\beta$-Gallium(III)oxide (Ga$_2$O$_3$) is emerging as a semiconducting material of great interest for fabrication and advancement of high powered devices because of its very wide bandgap, excellent electrical properties and high breakdown voltage. In this work, epitaxial films of as-grown and Si doped $\beta$-Ga$_2$O$_3$ were fabricated by Metalorganic Chemical Vapor Deposition (MOCVD) and were characterized by X-Ray Diffraction (XRD), Thermoluminescence (TL) and Hall Effect measurements. The XRD patterns revealed formation of pure epitaxial $\beta$-Ga$_2$O$_3$ phase. Luminescence was recorded in the range of 200-800nm using TL between -190 °C to 360 °C to detect all emission centers. An electron trap was identified at very low temperatures. Electrical properties including resistivity, density and mobility were determined using Hall Effect measurements. This study illustrates an efficient method to grow pure epitaxial $\beta$-Ga$_2$O$_3$ as well as identify its fundamental properties and investigate the role of defects.