Effects Of Dopants on the Electrical Transport Properties of Czochralski (CZ) and Edge-Defined Film-FEED (EFG) Growth Grown $\beta$-$\text{Ga}_2\text{O}_3$\textsuperscript{1} Dhan Rana, Bowling Green State Univ, Pooneh Saadatkia, Sahil Agarwal, Farida Selim, Bowling Green State University — Gallium oxide ($\text{Ga}_2\text{O}_3$) is the widest band gap (4.8-5.0 eV) semiconducting oxide known so far transparent up to UV-C range. Due to wide band gap and high Baliga’s Figure of Merit (FOM), it possesses excellent material properties for high power device applications. It exists in five different polymorphs ($\alpha$, $\beta$, $\gamma$, $\delta$ and $\varepsilon$), with $\beta$ being the most stable at all temperatures. Electrical transport properties of Czochralski (CZ) grown and Edge-Defined Film-Fed Growth (EFG) grown samples were evaluated by using Hall effect and Van der Pauw techniques. The conductivity of samples was found to be highly dependent on doping material. Un-doped $\beta$-$\text{Ga}_2\text{O}_3$ single crystal is highly resistive ( $10^7 \, \Omega \cdot \text{cm}$), but the Sn-doped $\beta$-$\text{Ga}_2\text{O}_3$ has significantly lower resistivity. The resistivity of Mg-doped and Fe-doped samples were relatively higher than the un-doped samples. Positron annihilation measurements were conducted to investigate the effect of compensating defects on conductivity.

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