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Study Of Electron Traps In β-Ga_2O_3 Single Crystals Using Thermoluminescence Spectroscopy MD MINHAZUL ISLAM, DHAN RANA, ARMANDO HERNANDEZ, FARIDA SELIM, Bowling Green State Uni — The presence of electronic defects in Gallium oxide (Ga_2O_3) single crystals greatly affects the transport of electrons and excitons. The origin of these electronic defects could be the anion/cation vacancies or the incorporation of impurities into the crystals during the growth process. The defects can act as electron traps that can affect the optical and electrical properties of Ga_2O_3 crystals by introducing intermediate energy levels in the bandgap. Identification of the nature of the defects is crucial for the successful application of β-Ga_2O_3 in optoelectronics. Shallow and deep trap levels associated with oxygen vacancies and iron impurities in doped (Mg-doped, Fe-doped, Sn-doped) and undoped β-Ga_2O_3 single crystals were studied using temperature and wavelength resolved thermoluminescence spectroscopy. Thermal activation energies of trap levels have been calculated using multiple heating rates and/or initial rise method depending on the kinetics and suitability. Ultraviolet to visible (UV-VIS) spectroscopy was performed on the samples to determine the bandgap (˜4.51 eV) that did not show any significant change due to the incorporation of dopants. Hall effect measurements were carried out at room temperature to determine the electrical parameters.

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