Optical properties of pure and Sn-doped β-Ga_2O_3 single crystals grown by optical Float Zone technique

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Abstract:

Recent research attention has been focused on gallium oxide (β-Ga_2O_3) single crystal, which has an ultra-wide bandgap (4.5–5.3 eV) semiconductor. The foremost interest of β-Ga_2O_3 crystal emerging from its potential applications in the fields of power devices and photo detectors. There are many reports available in the literature, not only the electrical properties of β-Ga_2O_3 but also optical properties. In this study, we extended our investigations on the optical properties of pure and Sn-doped β-Ga_2O_3 single crystals. The optically good quality single crystals of pure and Sn-doped β-Ga_2O_3 have been grown (shown in Figure 1) by the floating zone technique. X-ray induced luminescence spectrum shows a maximum emission peak at 365 nm. It is well known that β-Ga_2O_3 shows defect-related luminescence which is due to recombination between donors (oxygen vacancies) and acceptors (pair of oxygen and gallium vacancies). In addition to this, low-temperature trap center analysis using thermoluminescence glow curves measurements and scintillation characterization under ^{241}Am α-ray excitation will be discussed in more detail.

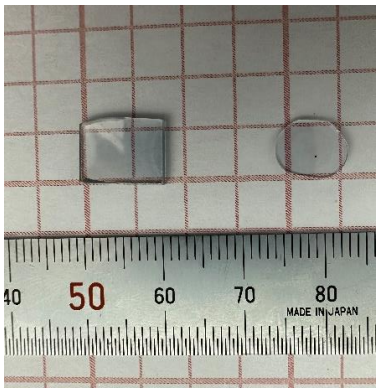

Figure 1. Photograph of cut and polished Ga_2O_3 single crystals

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