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Optical and Electrical Characterization of Melt-Grown Bulk Ternary $\text{In}_x\text{Ga}_{1-x}\text{As}$ ¹ J. WEI, S. GUHA, L. GONZALEZ, Air Force Research Laboratory, P. DUTTA, G. RAJAGOPLLAN, United Semiconductors, Y. K. YEO, R.L. HENGHOLD, Air Force Institute of Technology — Recent crystal growth technology breakthroughs led to successful growth of good quality bulk melt-grown ternary $\text{In}_x\text{Ga}_{1-x}\text{As}$ single crystals. However, these bulk materials have not been well investigated compared to the epitaxial layers grown on a binary compound semiconductor, GaAs. Therefore, the optical and electrical properties of the bulk grown $\text{In}_x\text{Ga}_{1-x}\text{As}$ have been investigated systematically as a function of temperature and In mole fraction x . The results show that the refractive index increases linearly with temperature from 100 to 300 K and also with In composition x from 0.0 to 0.9 for several IR wavelengths. Typical refractive index values are 3.388 and 3.376 for 4.6 and 10.6 μm , respectively, at 300 K for $x=0.5$. The results of Hall-effect measurements show that the electron concentrations increase monotonically with x , while the mobilities decrease as x increases from 0.5 to 1.0. Typical electron concentration and mobility at 300 K are $1.3 \times 10^{16}/\text{cm}^3$ and $9.1 \times 10^3 \text{cm}^2/\text{V S}$, respectively, at $x=0.75$.

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