

ACTIVATION ENERGY OF $\text{In}_x\text{Ga}_{1-x}\text{As}$ THIN FILM PREPARED BY MBE

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ABSTRACT

Electrical conductivity and carrier concentration were measured on thin films of $\text{In}_x\text{Ga}_{1-x}\text{As}$ at a temperature region from 273K to 323K. The thin films were grown on single crystal GaAs substrate by Molecular Beam Epitaxial method. It is found that the electrical conductivity and carrier concentration at room temperature for GaAs and $\text{In}_{0.14}\text{Ga}_{0.86}\text{As}$ are 15.31×10^{-3} and $1.292 \text{ mho-cm}^{-1}$ respectively and the activation energy calculated from conductivity graphs for these two samples are $\approx 0.11 \text{ eV}$ and $\approx 0.01 \text{ eV}$ respectively. For samples with $x = 0.185$ and $x = 0.205$, electrical conductivity at room temperature are 9.71×10^2 and $3.94 \times 10^2 \text{ mho-cm}^{-1}$ respectively. Two activation energies are observed in these two samples, one at below room temperature and other at above room temperature. For $x = 0.185$ and $x = 0.205$ composition these values are 0.041 eV and 0.143 eV respectively at below room temperature and are 0.056 eV and 0.415 eV respectively at above room temperature.

KEYWORDS: Conductivity, Concentration, Temperature