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FTIR assessment of In_xGa_{1-x}As

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The binary In_xGa_{1-x}As alloy finds application as HEMT transistors, laser and photodiodes, triple-junction photovoltaic devices and infrared detectors, due to its advantageous band gap, which varies from 0.36 to 1.425 eV. It is thus important to determine the bandgap of grown layers in order to engineer and control the optical properties of grown epilayers of In_xGa_{1-x}As.

Five In_xGa_{1-x}As epilayers grown by metallorganic vapour phase depositioning (MOCVD) were assessed by reflectance Fourier Transform Infrared spectroscopy (FTIR). A Bruker 80V FTIR/Raman system, fitted with a horizontal stage sample holder, enabling near-normal incidence of incident radiation, was employed. 100 Scans of each sample were obtained at a resolution of 8 cm-1. Spectra obtained allowed determination of both the band gap from the inflexion point on the spectra, and epilayer thickness from interference fringes. Two theoretical models were used to obtain the required refractive index as function of wavenumber for thickness calculations. Results obtained indicated that the respective band gaps varied between 1.2 – 1.4 eV, while the layer thicknesses varied between 1 and 2 micron. Experimental values are in agreement with information provided by the crystal growers. Results will be presented and discussed.

Summary

Band gap and layer thickness determination of In_xGa_{1-x}As epilayers using FTIR reflectance spectroscopy.

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