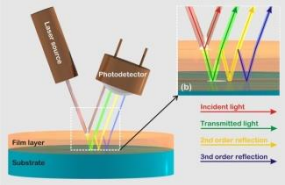
ThetaMetrisis APPLICATION NOTE #043

Characterization of thin GaAs layers



Introduction:

GaAs (Gallium Arsenide) is a III-V semiconductor with high electron mobility, wide direct energy band gap and also create less noise in electronic circuits than silicon devices. Gallium arsenide has a wide range of applications such as: optical windows and space electronics, laser diodes, solar cells, infrared LED's, microwave integrated circuits etc. GaAs is often used as a substrate material for the epitaxial growth of other III-V semiconductors, e.g. InGaAs, AlGaAs, InGaAs and others. In this application note, a ThetaMetrisis FR-pOrtable tool is used for the characterization of GaAs layers deposited on Si and GaAs substrates.

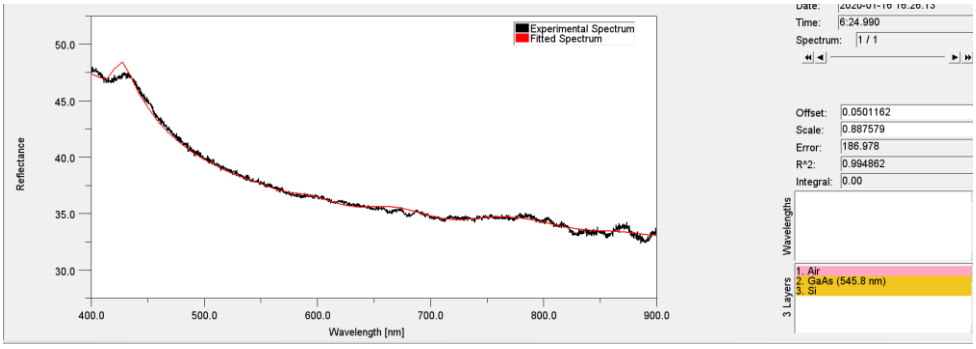
Means & Methods:

Two samples provided for characterization, one of them was a **GaAs layer deposited on Si substrate** and the other one was a **GaAs layer on AlGaAs layer deposited on top of GaAs substrate**. Measurements were done by a standard **FR-pOrtable tool** operating in the 380nm-1000nm spectral range capable to measure thicknesses from 12nm up to 90um.

Results:

Typical experimental reflectance spectra (black line) and fitted reflectance spectra (red line), as recorded by the FR-Monitor software, and the thickness values measured, are illustrated in the figures below. In both cases, very good match between the two spectra was demonstrated.

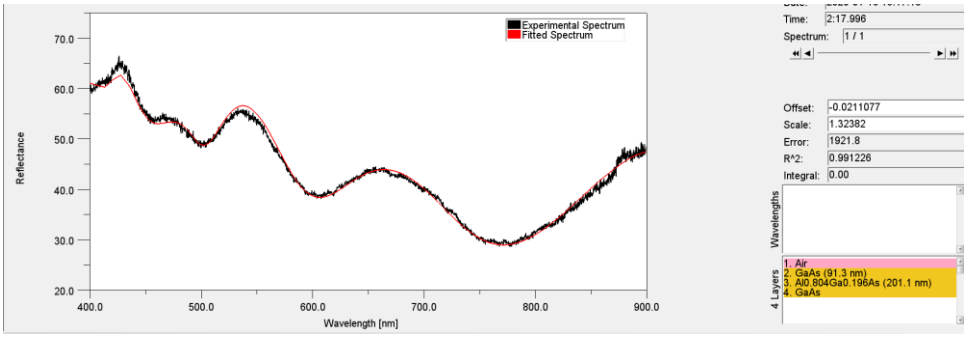
Sample 1



Thickness measured

GaAs layer measured at **545.8nm**

Sample 2



Thickness measured

GaAs layer measured at **91.3nm** and **AlGaAs** measured at **201.1nm**

Conclusions: FR-pOrtable tool was successfully used for the thickness calculation of GaAs and AlGaAs layers on Si and GaAs substrates.