SAFC Hitech™
Enabling Technology

technical bulletin

EpiPure™ TMI and EpiPure™ TMA

Improved minority carrier performance for Al(In)GaAs materials grown at Sheffield University (UK)

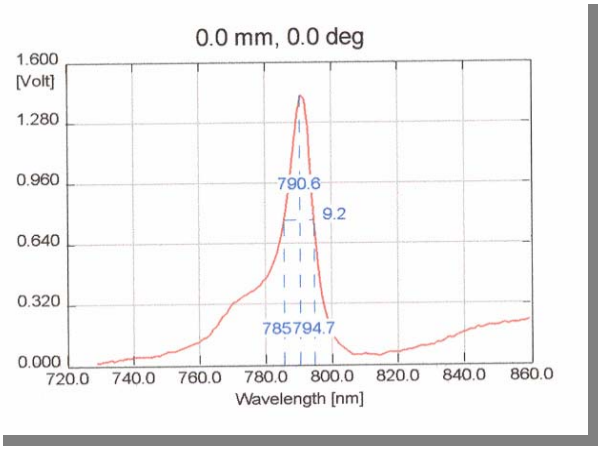
Over a number of years, SAFC Hitech has pursued an active and fruitful collaboration with the growth team at Sheffield University to examine precursor performance. Data has been accumulated during this period to demonstrate the continuous improvements made to precursor quality. More importantly, recent data highlights the improved minority carrier performance and low oxygen content of AlGaAs structures achievable with the latest source materials. Recent trials have focused on developments with the EpiPure™ grade of products, particularly TMI and TMA.

With the introduction of an improved in-house analytical technique at SAFC Hitech, the refinement of process parameters has been successful in lowering impurity species in both TMI and TMA to record levels. Trials in growth have confirmed the improvement illustrated below.

An 808nm GRINSCH laser structure was grown by MOVPE at Sheffield University with new EpiPure™ products. The room temperature PL data was obtained using a few mW of 633nm HeNe laser light from the as-grown 50mm wafer. The SQW of 96A InAlGaAs was roughly 1.6microns below the surface with a heavily Zinc doped 0.2 micron GaAs cap layer. A significant point is that until recently no RT PL could be achieved from such as-grown structures. Instead, etching to just above the QW was the only method of assessing luminescence.

The data clearly shows an increase in minority carrier lifetime for the QW and upper cladding layer of this material. The well resolved spectra and dominance of the QW over capping layer luminescence demonstrates this significant quality improvement.

The spectrum has been characterized and an intense electron-heavy hole transition with the shoulder to shorter wavelength attributable to the electron-light hole transition. The weak broad peak to higher wavelength is due to the GaAs capping layer, which in a poorer minority carrier sample would be the major signal from this structure.



EpiPure™ TMI + EpiPure™ TMA