

# ORS

# R-FIT<sup>®</sup> LIVE

Characterise your layers in-situ with our fully automated quantitative reflectance analysis package. Developed in response to manufacturing needs, R-Fit<sup>®</sup> LIVE from ORS, turns your data into information on up to 16 samples per run. Totally "hands free", R-Fit LIVE offers unrivalled resolution in reflectance fitting. Information is immediately available, enabling statistical process control of your production runs.

No other commercially available quantitative reflectance analysis package has the resolution and the volume capacity of R-Fit<sup>®</sup> LIVE. R-Fit<sup>®</sup> LIVE offers you complete quantitative analysis of your reflectance data, number crunching the data as it arrives and without the need for user interaction. Up to 16 individual samples per production run can be analysed while you watch for the:

- > complex reflective index (n and k)
- > growth rate
- > individual layer thicknesses
- > RMS roughness
- > standard deviation of each sample from the average

With no limit on the number of layers in each structure and the ability to quantify the data from as little as 20Å of material deposited, R-Fit<sup>®</sup> LIVE gives you the power to fine-tune the characteristics of your material as you deposit and to ensure your material is within the tightest specifications time and time again.

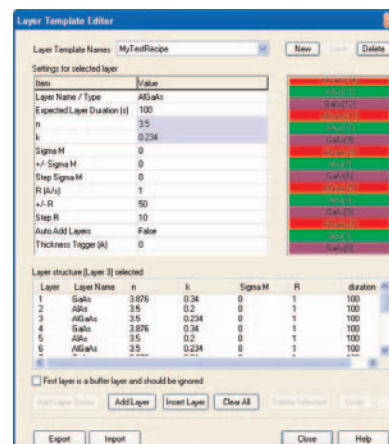
R-Fit<sup>®</sup> LIVE works by having a memory-resident model of your structure. As you deposit, R-Fit<sup>®</sup> LIVE uses this model as a template to fit each individual interferogram in your current production run and find the best quantitative fit of the materials' parameters. Each fit is entirely independent of the others in the run giving you an individual analysis of every sample. By completely quantifying the interferometry data, R-Fit<sup>®</sup> LIVE offers you more than lesser techniques such as fingerprinting, or fits based on library refractive index values. The quantitative results from R-Fit<sup>®</sup> LIVE have been proven to be directly related to the resulting structures ex-situ characteristics (see over). This gives you unprecedented power to characterise and control the material in your production processes.

With the ability to build the model for your production structures in R-Fit<sup>®</sup> LIVE itself (see image below), or to import the model from R-Fit<sup>®</sup>v4, R-Fit<sup>®</sup> LIVE has a flexible set up procedure.

When working in conjunction with an instrument from ORS, R-Fit<sup>®</sup> Live may be configured for TCP/IP control, allowing for direct feedback of the latest results from your production run to the reactor control software.

With a highly competitive capital cost, R-Fit<sup>®</sup> LIVE will lead to an increase in the efficiency of your production runs that gives you a fast return of investment.

Choose the smart option - Choose ORS.  
And take **control**.



Above: The R-Fit<sup>®</sup> LIVE Layer template dialog box, where the user builds a new model for production run analysis

### Guaranteed product yield with R-Fit<sup>®</sup> LIVE!

Vertical Cavity Surface Emitting Lasers (VCSELs) are one of the most demanding structures grown in compound semiconductor reactors with some of the tightest constraints on specification. The ability to give the grower the information he needs to control the growth of this material represents one of the more challenging scenarios for in-situ monitoring.

With a direct correlation between in-situ measured growth rate by R-Fit<sup>®</sup> LIVE\* and ex-situ characterisation of the Centre Stop Band of VCSEL structures as quantified by PL mapping, R-Fit<sup>®</sup> LIVE has been proven to be a reliable metric for increasing the yield of in-spec wafers in the production of these materials.

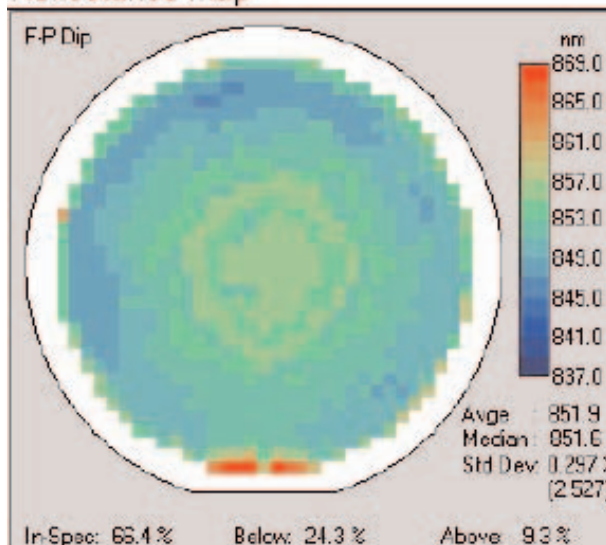
The figure to the right shows the PL map of an in-spec wafer. The key to the CSB value is given by the coloured bar code to the far side of the image.

By comparing the post growth measured CSB value with the in-situ measured growth rate (graph below, right) of key layers within the structure, an excellent correlation between the two values is found, demonstrating that R-Fit<sup>®</sup> LIVE is a reliable tool for measuring the final CSB value of VCSELs while the structure is growing.

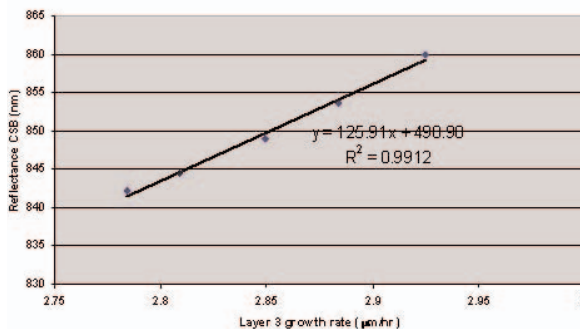
**Therefore, by controlling the growth rate of the key layers using R-Fit<sup>®</sup> LIVE, it is possible to ensure that the centre stop band specification is hit and maintained every time you grow so increasing process yield.**

\* Results were recorded on an Aixtron 2400 G3 MOCVD reactor.

Reflectance map



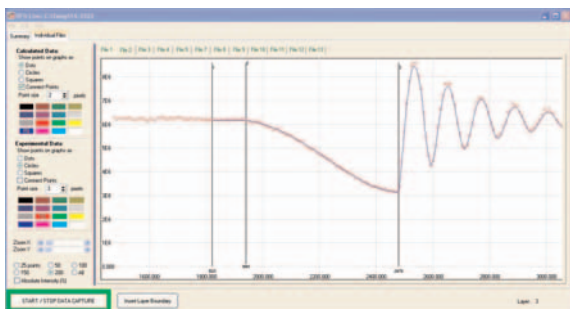
PL Map of an in-spec wafer.



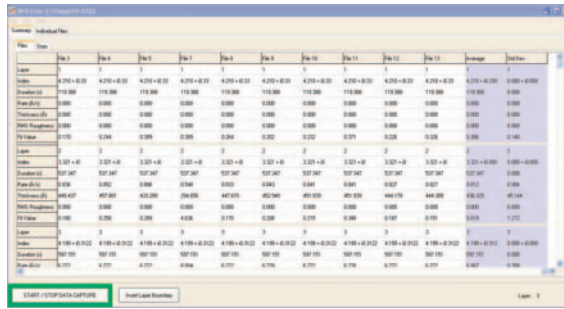
A plot of growth rate vs. Centre Stop Band of this VCSEL structure shows a direct correlation between the two.

### Intuitive interface

R-Fit<sup>®</sup> LIVE has an intuitive general user interface that allows the operator to view the output data in several ways.



Tab between individual interferograms and watch the fit update as new reflectance data from a sample position arrives.



View the information from all your wafers on the Summary tab. Here, statistical information on your production run is also found.