



ORS

EPIEYE[®] PROFESSIONAL

Take the stress out of measuring strain with the EpiEYE[®] Professional solution from ORS. With a "spot position" version for MOCVD reactors without satellite rotation and a "spot separation" version for MOCVD reactors with satellite rotation and all MBE reactors, there is a solution for wafer bow measurements from ORS to meet your needs.

ORS Ltd. offers two versions of the EpiEYE[®] Professional for wafer curvature measurements in MOCVD and MBE. The EpiEYE[®] Professional-P uses the location of the reflected spot on a position sensitive detector to measure curvature, while the EpiEYE[®] Professional-S uses spot separation to measure the bow. The choice of EpiEYE[®] Professional version will depend on the reactor type. For all MBE systems, we offer the S version. This version would also be the choice for MOCVD reactors with satellite rotation, e.g. most Aixtron reactors. For those MOCVD reactors without satellite rotation, we offer the P version. This version would be appropriate for reactors such as the Thomas Swan Showerhead and Veeco TurboDisc[™] tools.

Both EpiEYE[®] Professional versions measure wafer curvature to a resolution of +/- 1 microns on all wafers in the line of sight of the optical head, as well as emissivity corrected pyrometry and dual wavelength reflectometry measurements on up to 16 different locations on your main stage per stage rotation. The location of these ECP and reflectance measurements is user-settable and is not restricted by pre-configured hardware settings*.

Our "spot location" solution has the added advantage of being compatible with a standard 2.5 mm optical port on a Thomas Swan Showerhead reactor, meaning that you do not need to make expensive modifications to your reactor top plate in order to make wafer curvature measurements! How's that for a money saving advantage!

The only requirement for operation of both versions of the EpiEYE[®] Professional on a rotating main stage reactor is a single TTL pulse per rotation.

Remote control of the EpiEYE[®] Professional may also be selected, so allowing you to directly integrate the instrument's operation with your reactor. This remote control may be achieved either by TTL triggers or TCP/IP instruction from your reactor's control software.

For those operator's who really want to get the most out of their EpiEYE[®] Professional, there is the option to add one or both of our R-Fit[®] packages. These quantitative reflectance analysis packages offer unrivalled capabilities for characterising your material and statistical process control of your growth.

All these features come with the World beating accuracy and stability of measurements that you have come to expect from instruments manufactured by ORS Ltd.

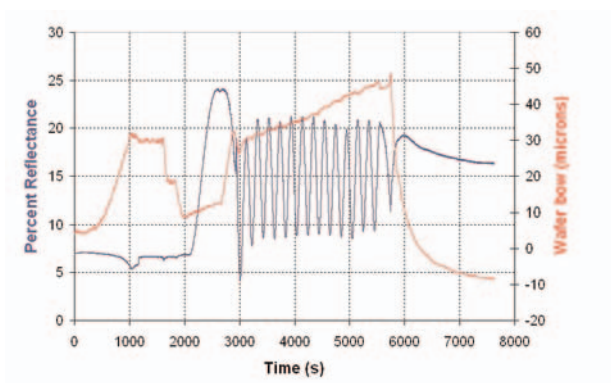
With a highly competitive capital cost, the EpiEYE[®] Professional will give you a rapid return on investment and leave you wishing you had installed a system on your reactor earlier!

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



Above: The EpiEYE[®] Professional's spot position optical head for measuring wafer bow

Wafer Bow in Nitrides



Stages in the growth process:

- > Heat to 1215°C
- > Bake out at 1215°C
- > Cool to 870°C
- > Nitridation at 870°C
- > Cool to 575°C
- > Nucleation layer
- > Heat to 1150°C
- > Bulk growth of GaN
- > Top layer of 20nm AlGaIn
- > Cool to room temperature

Measurement of wafer curvature has proven to be of particular benefit in the deposition of Nitrides. In these material systems, the high growth temperatures and the differences in the thermal expansion coefficients of the epitaxial layers and the underlying substrates results in large changes in the curvature of the wafers during growth and on subsequent cool down.

Above is a measurement of the wafer bow and reflectance at 670nm during the deposition of a Nitride Heterostructure Field Effect Transistor (HFET) on sapphire in a Thomas Swan Showerhead reactor, where the main stage rotation speed was 100 rpm.

These measurements were recorded using the "spot location" version of the EpiEYE® Professional and were made using a single standard 2.5 mm optical port on the Thomas Swan Showerhead.

As can be seen, the bow follows the classic profile for nitride growth onto sapphire, with large temperature changes inducing large curvature changes. The bow becoming increasingly concave during buffer deposition and finally convex on cool down.

This graph shows the particular benefits of the EpiEYE® Professional-P version applied to Thomas Swan Showerhead reactors, where no expensive modifications to the reactor are necessary in order to make curvature measurements.

For more information see:

- > The EpiEYE® Professional Technical Specifications

Reactor	Spot position	Spot separation
Thomas Swan Showerhead	◆	
Veeco MOCVD	◆	
Aixtron		◆
MBE		◆

Table 1: Reactor type versus wafer bow measurement method.

Table key:
 Spot position: EpiEYE® Professional-P
 Spot separation: EpiEYE® Professional-S

* For further detail on the setting of sample point locations, see the EpiEYE® Basic Product Flyer