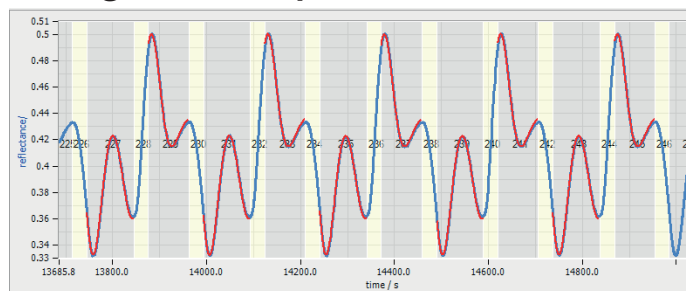# EpiX – a modular wafer mapping station for compound semiconductor research

The EpiX wafer mapping station is the latest LayTec product for compound semiconductor R&D. Currently, there is an ongoing boom in MOCVD grown III-V lasers, with a respective revival in related material research. LayTec already supports this with new in-situ metrology products such as EpiTT VCSEL or EpiTT FaceT and EpiX is next. The first EpiX station was installed at a customer site in mid-2018. It combines white light reflectance with photoluminescence (PL) measurements, and thus allows for a comprehensive 2D analysis in a wide spectral range (400 nm to 1700 nm).

Up to four PL excitation wavelengths can be combined with an optional eye-safe plug-in interface for customer's additional external excitation lasers. Integrated software provides full data analysis, including automated detection of VCSEL optical parameters (cavity-dip, stop-band position), single layer and multiple layer thickness fits, film composition and multiple-peak analysis. Moreover, customers benefit from sample's statistics and pass/fail classification on wafer-level and die-level.

During MOCVD: EpiTT

405nm in-situ reflectance during p-DBR growth: as measured (blue) and fittes (red)

After MOCVD: EpiX

p-DBR stop-band center   AlGaAs layer thickness   AlGaAs composition

Measures **in wafer center** growth rates and AlGaAs composition of p-DBR:

$d_{Al(0.1)GaAs}$ = 57.2 nm

$d_{Al(0.9)GaAs}$ = 49.8 nm; X_{Al} = 91.5%

→ in-situ results used as input parameters for 2D mapping analysis

Measures **full 2D wafer maps** of p-DBR's uniformity in stop-band center position, layer thickness and layer composition
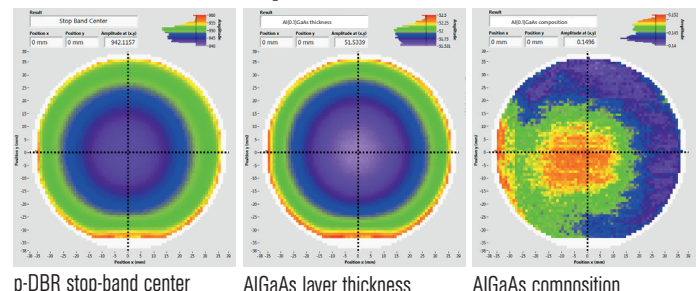
The basic design feature of EpiX mapping stations is modularity and customizability in hardware and software. This is key for customers regularly adjusting their research projects to new materials and latest nano-science concepts. Hence EpiX is designed as a long-lasting workhorse with multiple upgrade options:

more optical heads (wafer bow, reflectance-anisotropy, sheet-resistance, wafer thickness, optical transmission), extended wavelength range, software interfaces (e.g. for user-owned spectral analysis libraries) and for using in-situ data measured during epitaxy in center of wafer as starting point for post-epi 2D mapping analysis.

EpiX mapping station (left) with plug-in optical heads (top) for white-light reflectance and PL
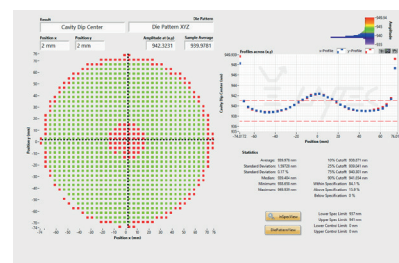
EpiX software: 2D in-spec/out-of-spec classification, die pattern analysis, XML reports, data interfaces to MES/SPC, analysis interfaces for multi-layer algorithms

You can meet us at the following workshops, conferences and trade fairs:

20–22 March 2019 | SEMICON China | Shanghai, China

26–27 March 2019 | CS International | Brussels, Belgium

29 April–02 May 2019 | CS Mantech | Minneapolis, MN, USA