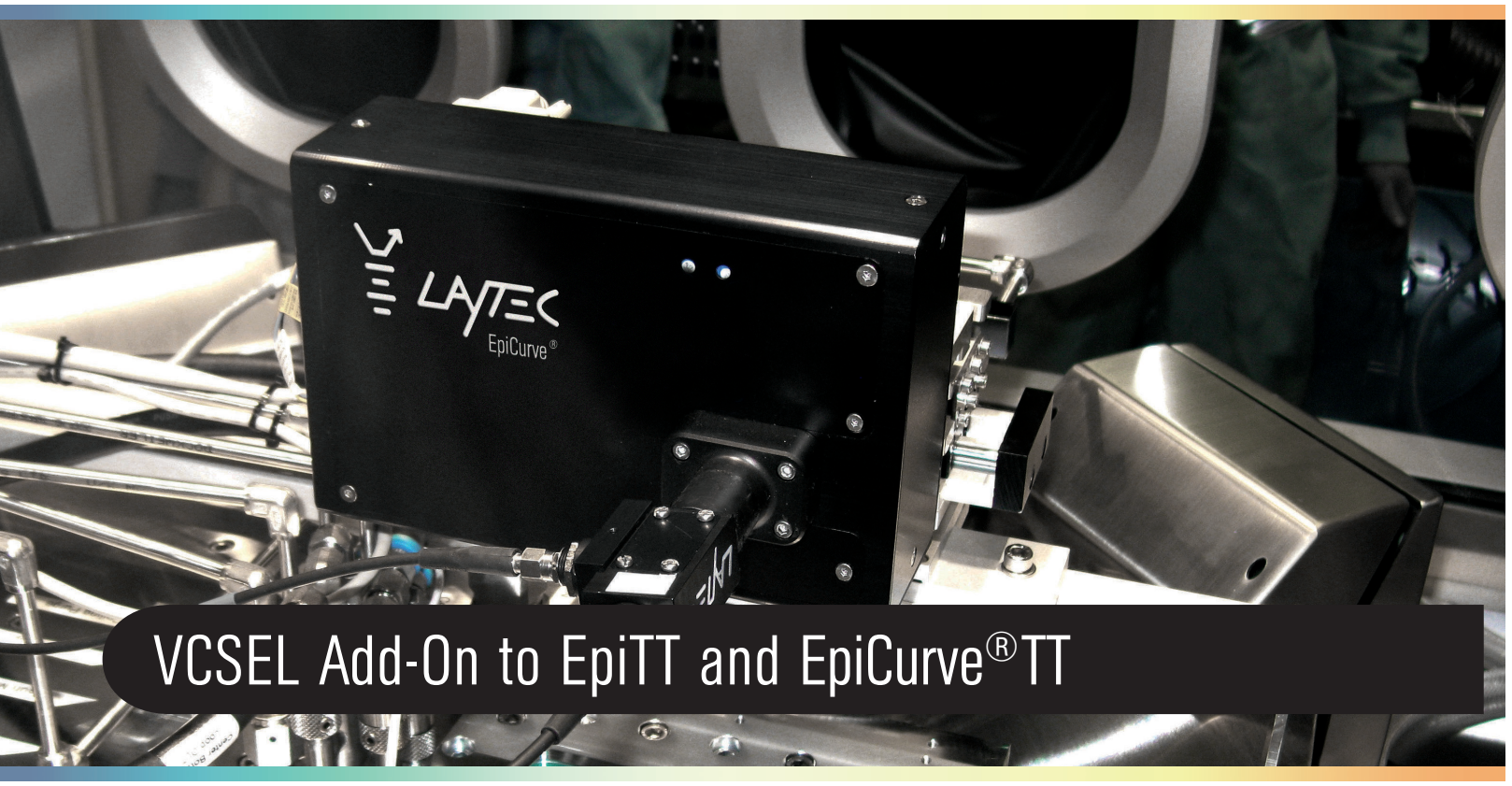

VCSEL Add-On to EpiTT and EpiCurve®TT

VCSEL Add-On to EpiTT und EpiCurve®TT is a spectroscopic reflectance tool for in-situ thin-film growth monitoring of GaAs-based VCSEL epitaxy that complements and expands the EpiTT and EpiCurve®TT performance. Based on a detector array, it provides an additional full spectroscopic measurement of the normalized and absolute reflectance. EpiTT VCSEL covers the vis-NIR spectroscopic range. Additional True Temperature (TT) modules for pyrometric temperature measurements outside the VCSEL's stop-band region are available on request.

Features

Spectroscopic reflectance

- Normalized reflectance measurements in the full spectral range (630 nm - 1100 nm)
- Time resolved spectroscopic measurement mode (color plot mode), see Fig.1
- Transfer of selected multi-wavelength reflectance transients to the EpiTT host system
- Automated detection of VCSEL optical parameters (cavity dip, stop-band position) at growth temperature and correlation with room-temperature

Temperature measurements (optional)

- Additional pyrometry module for the EpiTT host system: fast wafer selective true temperature measurements, pyrometer cross-calibrated to the main 950 nm pyrometry
- Pyrometry wavelength selectable depending on type of VCSEL process for avoiding conflict with the stop-band position
- Embedded control software for data display and data storage
- Allows measurements on single and multiple wafers

Communication / integration

- Communication and data exchange with growth system control computer through EpiTT host system
- Remotely controlled from growth recipe through EpiTT host system

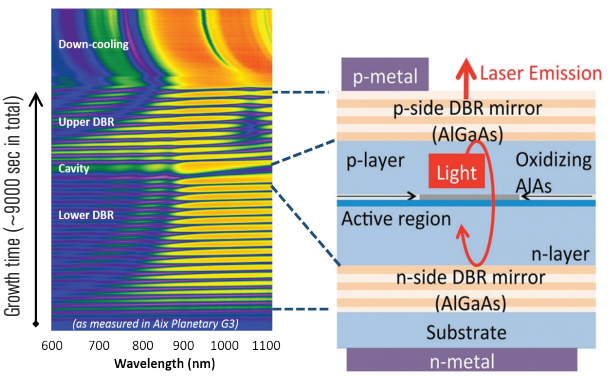

Fig. 1: Real-time color plot correlated to final device

With EpiTT VCSEL every single VCSEL wafer in the reactor is under tight control

Measurable growth parameters

- VCSEL tuning by determining the spectral position of stop band and cavity dip
- VCSEL tuning by determining the absolute reflectance of stop bands: typical accuracy better than ± 1 %
- Reflectance: typical noise better than ± 0.5 %
- In conjunction with EpiTT analysis tools: growth rates of H- and L-layers in DBRs, taking composition grading into account

Optical head

- Option 1: The VCSEL Add-On shares the fiber-optical head and with the EpiTT host system
- Option 2: As Option 1, but in conjunction with an EpiCurve® TT head (EpiCurve® TT VCSEL)

Electronic control unit

- Tungsten lamp (9 W) with 100 Hz modulation unit; typical life-time according to manufacturer: 6.000 h, adjustment-free lamp unit for quick replacement reduces downtime
- Embedded Beckhoff CX computer for data analysis and data storage
- 2048 pixel CCD detector array, 630 nm - 1100 nm
- Signal interfacing to EpiTT host system

Operating conditions

- 10 - 35 °C ambient temperature / relative humidity: 0 - 95 % non-condensing

Size and weight of parts

- Controller body: 430 mm x 350 mm x 180 mm (4 HU) / weight: ~ 12 kg

Electrical connections / power consumption

- 110 V / 240 V mains / Typical consumption 50 W
- RJ 45 Ethernet connection to EpiNet PC
- D-SUB 15-pin hardware interface to EpiTT / EpiCurve® TT controller has to be updated to the latest (2017) version
- Optional: Other inputs and customer-specific interfaces upon request

Specifications are subject to further technical development and may differ from those given in the data sheet. In certain cases, performance may be limited by reactor type and/or growth conditions. Please consult our technical sales team to see how LayTec metrology can best serve your specific application.

For further information please contact:

LayTec AG
Seesener Str. 10-13
10709 Berlin, Germany

Tel.: +49 (0)30 89 00 55-0
Fax: +49 (0)30 89 00 55-180
Email: info@laytec.de
Web: laytec.de

Knowledge is key

Developed, manufactured, qualified in Germany.

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