EpiTT Band Edge – for MBE of InP based VCSEL devices

LayTec is proud to announce the shipment of its new metrology tool "EpiTT Band Edge" to the Walter Schottky Institute (WSI) in Munich. The tool is specially designed for MBE of InP- and GaAs-based device structures. Researchers in Prof. M.-C. Amman's group at WSI are growing InP-based VCSELs in several MBE chambers in close collaboration with partners from the laser industry. Hence, rather unusual for university institutes, accurate chamber-to-chamber matching and extreme run-to-run reproducibility is a must. Since last September, after shipment and installation of an EpiTT Band Edge, finally all MBE systems at WSI are equipped with EpiTTs for highly accurate growth-rate control during VCSEL epitaxy (utilizing automated pyrometric Fabry-Perot analysis) and Band Edge wafer temperature sensing. Accordingly, all MBE systems are always running at exactly the same absolute substrate temperature scale. Band Edge temperature sensing is a new Add-On option to EpiTTs and is designed for seamless integration into the EpiTT fiber-optic head technology. Using the substrate heater radiation as light-source, the optimum temperature range is 350-600°C for InP wafers (see Fig. 1, reproducibility is ± 1K) and covers well the growth conditions of InP VCSEL devices for ultra-fast data communication and gas sensing applications.

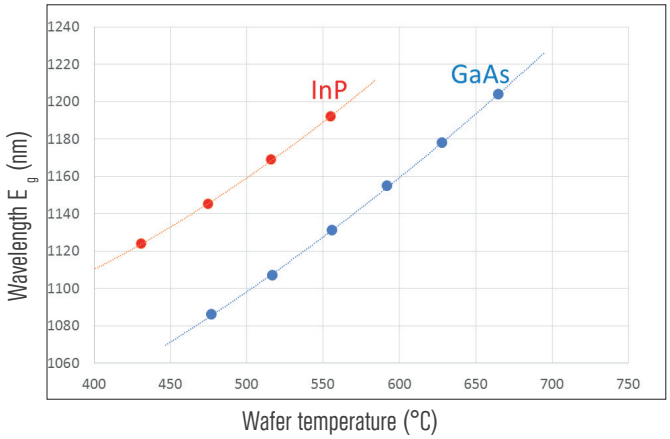

Fig. 1: Correlation between wavelength position of InP and GaAs transmission band edge and wafer temperature. Both measurements have been performed at WSI and used thereafter for automated substrate temperature sensing and VCSEL process transfer to other MBE chambers.

GaAs based edge-emitting high-power IR lasers – yield ramp-up by EpiTT FaceT

Precise control of laser facet temperature during facet passivation and coating of stacked GaAs-based laser bars in an MBE chamber is a challenge. Until recently, the process temperature of laser facets was only estimated indirectly by the temperature of the heater, although it is a known fact that this method cannot provide the real temperature of the facet surface (see Fig. 2). Consequently, deviations in this temperature significantly affected process quality (facet cleaning and facet passivation) and production yield. As a solution to this problem, LayTec has developed the EpiTT FaceT – a new in-situ spectroscopic metrology tool which is capable of measuring the temperature of GaAs laser facets during cleaning and passivation (accuracy ± 1K from room temperature up to 400°C) in conjunction with real-time sensing of the ZnSe passivation layer thickness (0 - 50nm).
Two EpiTT FaceT systems, capable of monitoring the facet temperature in multi-stack configurations of laser bars at rotating platens in MBE, have been already installed at customer site in 2018 and a third one is scheduled for shipment to a leading industry customer in 2019 / Q1.

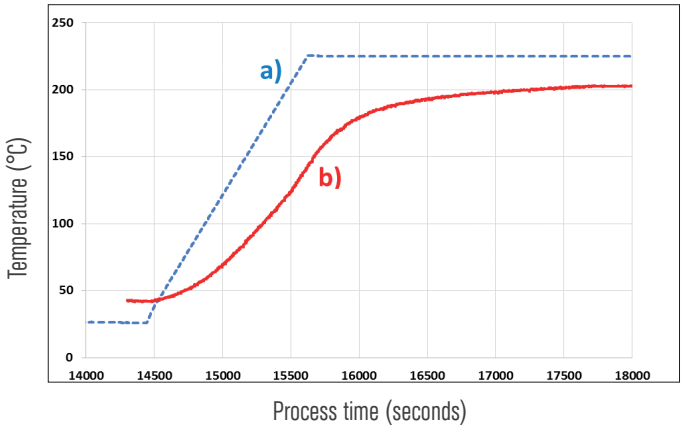

Fig. 2: Temperature during plasma-assisted cleaning of laser facets in a stack of laser bars mounted at a platen in a MBE process chamber:
a) temperature of heater (as formerly used for process temperature control) and
b) true temperature of the laser facets as measured by EpiTT FaceT.

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 ManTec | Minneapolis, MN, USA