EpiRAS® TT: MBE growth and reactive ion-etching of AlGaAs

The group of Prof. Henning Fouckhardt at Kaiserslautern University of Technology recently published [1] their latest results on the use of a **LayTec EpiRAS® TT** metrology tool for optimizing both MBE growth and reactive ion-etching (RIE) of AlGaAs structures. Reflectance-Anisotropy signatures have been used in order to investigate the GaAs and AlGaAs surface status under various etching procedures in the RIE chamber. Optimized etching conditions create perfectly smooth etching surfaces and therefore in the reflectance trace (see Fig. 1) the in-situ signatures during RIE nicely resemble the (inverted) in-situ reflectance traces of the former MBE growth of the same structure.

[1] L. Barzen et al. Applied Surface Science 328 (2015) 120–124

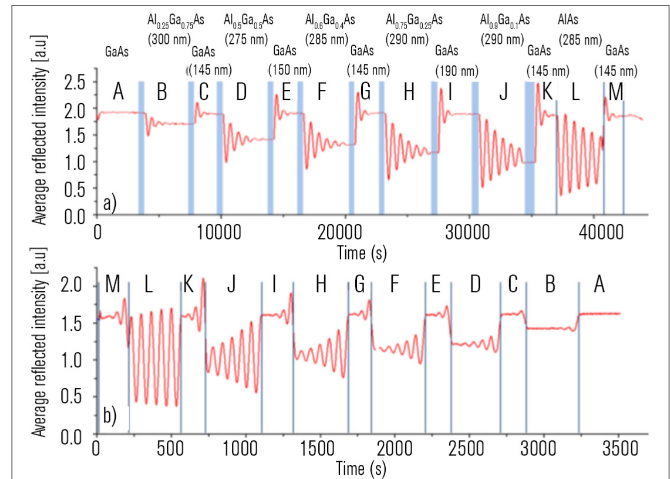

Fig.1: AlGaAs calibration structure: a) single-wavelength 435 nm reflectance transient during MBE growth and b) nicely inverted reflectance transient of the same sample during subsequent RIE (with "negative" growth rate and inverted order M→A of the MBE growth sequence A→M).

In-situ photo-luminescence of growing III-Nitride LED structures

In a collaboration between LayTec and Prof. Dirk Rueter´s group at University of Applied Sciences Ruhr West a breakthrough has been achieved regarding the real-time monitoring of InGaN/GaN quantum well emission wavelength during MOCVD growth. It is well known that room temperature wafer based photoluminescence (PL) measurements provide an excellent forecast of the emission wavelength and emission intensity of the later LED devices. Recently, a prototype in-situ PL system worked simulatnneously with a **LayTec Pyro 400** in a commercial multi-wafer MOCVD reactor. The related paper [2] was rocketed immediately to the status of "most downloaded Journal of Crystal Growth articles" from ScienceDirect. This work is supported under grant KF3242801NT3 by BMWi (German Federal Government).

[2] C. Prall et al. in Journal of Crystal Growth 415 (2015), 1–6.

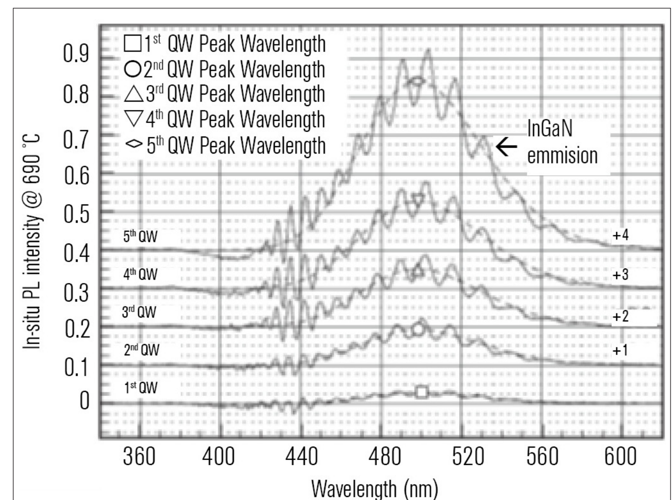

Fig.2: In-situ spectra of a growing InGaN MQW structure (solid lines) at wafer temperature of 690 °C. The InGaN PL peak wavelength was extracted from Gaussian fits (dashed lines) to eliminate the FPOs.

LayTec contributes to 'InteGreat' – R&D consortium led by OSRAM

In December 2014, an OSRAM led joint R&D initiative started its work: "Integrated high-volume manufacturing of LEDs along the manufacturing chain from large wafers to panels" (4 industry partners and 2 Fraunhofer Institutes). Based on our expertise in integrated metrology, LayTec contributes to this consortium with innovative metrology systems for supervision and characterization of LED wafers and panels in manufacturing lines. The project is supported by **German BmBF (initiative: "photonic process chains")** under grant 13N13132.

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

15 – 18 March 2015 | **EUROMBE 2015** | Canazei, Europe |
15 – 19 March 2015 | **SEMICON China 2015** | Shanghai, China |
Tom Thieme (LayTec) presents: **Next generation of in-situ metrology systems for highest epitaxial yield LED production** |
28 – 30 April 2015 | **SNEC 2015** | Shanghai, China | Booth E3-550 | JSUN |
18 – 21 May 2015 | **CS MANTECH 2015** | Scottsdale, AZ, USA |
Dr. Oliver Schulz presents: Fast and highly accurate in-situ calibration of AlGaAs ternary composition for MOVPE-based growth of edge-emitting diode lasers