EpiTT in GaAs wafer foundry: fast recalibration of GaAs/AlGaAs MOCVD

Operating MOCVD in III-V foundry businesses faces the specific challenge of frequent change of growth recipes for different customers with specific MOCVD re-calibration needs. Therefore, at recent CSManTech latest progress in fast and high-accuracy in-situ calibration of AlGaAs composition and AlGaAs growth rate was presented in a joint contribution from JENOPTIK, NRC Canada and LayTec. In-situ reflectance based AlGaAs process calibration in conjunction with **AbsoluT** based GaAs wafer temperature sensing can fully replace established but time-consuming ex-situ calibrations (XRD, PL and others). Thereby this new approach shortens significantly the non-productive recalibration time between MOCVD runs for different customers. For more details please see the copy of slides as presented at CSManTech 2015 on **www.laytec.de.**

Table 1: In a multiple 450 nm AlGaAs layer stack (sandwiched between 750 nm GaAs layers) the in-situ measured AlGaAs composition x and growth rate r exactly matches the XRD reference measurement. A new, highly accurate AlGaAs refractive index database in the 600°C-710°C temperature range and precise wafer temperature measurement with AbsoluT calibration have been applied.

Run F	Ex-situ XRD		In-situ EpiTT	
Layer	r (nm/s)	x	r (nm/s)	x
GaAs	0,597	0,000	0,602	0,002
Al(0,4)GaAs	0,553	0,402	0,564	0,402
GaAs	0,596	0,000	0,602	0,000
Al(0,6)GaAs	0,566	0,601	0,558	0,607
GaAs	0,596	0,000	0,600	0,000
Al(0,7)GaAs	0,583	0,695	0,577	0,690
GaAs	0,597	0,000	0,599	0,000
AlAs	0,589	1,000	0,598	1,000
GaAs-Sub.				

EpiTT: speeding-up the R&D for GaN-epi on (WS_2, MoS_2) 2D substrates

Dr. Arnab Bhattacharya of Tata Institute in Mumbai, India, reported at last week's LayTec in-situ Seminar (EWMOVPE, Lund, Sweden) on latest in-situ results for a completely new type of growth process: MOCVD of GaN on transition-metal dichalcogenides (WS_2, MoS_2). These new 2D materials have a graphene-like structure and obviously are suited as substrates for III-Nitride growth. While searching for the best growth parameters Dr. Bhatacharya's team used LayTec's EpiTT for real-time observation of growth rates and growth modes (see Fig.1). Please, see **www.laytec.de** for a copy of the related slides.

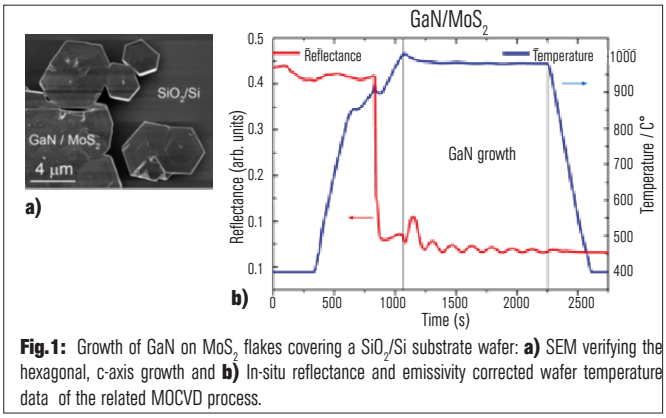
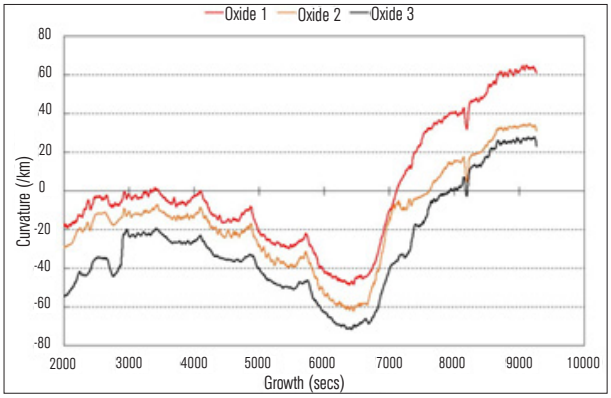


Fig.1: Growth of GaN on MoS_2 flakes covering a SiO_2/Si substrate wafer: **a)** SEM verifying the hexagonal, c-axis growth and **b)** In-situ reflectance and emissivity corrected wafer temperature data of the related MOCVD process.

EpiCurve® TT at Emcore D180 for BluGlass' remote plasma CVD

At LED Forum/Semicon China 2015 Dr. Ian Mann (CTO of BluGlass) reported on latest progress in remote plasma CVD (RPCVD) for manufacturing of high-brightness LEDs.



For verifying the success of the reduced temperature processes (p-GaN) and reduced cost approach (N_2 precursor). Dr. Ian Mann applied EpiTT and **EpiCurve® TT** in-situ metrology on the D180 platform modified for RPECVD.

Fig. 2: Wafer bow as measured by EpiCurve® TT during GaN RPECVD growth on 3 differently prestraining silicon/REO templates provided by Translucent (these BluGlass data have been presented by Andrew Clark of Translucent, at CS International 2015).

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

28 Jun – 02 Jul 2015 | **CS Week 2015** | Santa Barbara, CA, USA |
Dr. Oliver Schulz presents: Advanced in-situ metrology for growth optimization of In_1-x$Ga_xAs_{1-y}P_y$ based devices
28 Jun – 02 Jul 2015 | **ICMAT 2015** | Singapore| **LayTec presents:** Advanced In-Situ Metrology for III-V on Silicon Technology
30 Aug – 04 Sep 2015 | **ICNS 2015**| Beijing, China | Booth #2