

Newsletter

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EpiRAS for Solarcells!

LayTec is proud to announce that it installed two **EpiRAS** systems recently: one at *IOFFE Institute* in Russia and one at the *Institute for Solar Energy, Polytechnic University Madrid*. Both systems will be used for solar cell applications.

The group of Dr. Algora and Dr. Rey-Stolle at the Polytechnic University Madrid will study multijunction solar cell structures for high concentrator applications. Their use of the **EpiRAS** system will range from routine *in situ* monitoring of the growth of multilayer structures for solar cells, to detailed spectrometric analyses of critical epilayers.

We are looking forward to close collaboration!

EpiCurve TT really takes the bow!

In order to meet the growing customers' demands, between December 2005 and February 2006 LayTec improved **EpiCurve's** resolution limits from $\pm 5\text{km}^{-1}$ down to $\sim \pm 1\text{km}^{-1}$. Respective measurements were performed during InGaN/GaN MQW growth in an AIX 200/4 RF-S reactor at the *University of Magdeburg* lately.

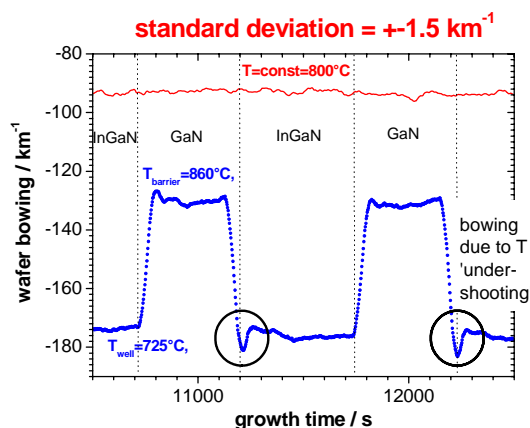


Fig. 1: *In situ* curvature measurement during InGaN MQW growth on GaN/Sapphire: tiny growth temperature effects give a clear bowing response with $\sim 4\text{km}^{-1}$ amplitude.

In Magdeburg, two LED test structures, both having 5 quantum wells (9nm period), were grown on Sapphire. A wafer bowing response during MQW growth showed up only when well growth temperature and barrier growth temperature were different. We found no indication that InGaN composition variations ($\sim 20\%$) in the 2nm thick barriers lead to additional bowing, as the red line (where no temperature effects are involved) shows. On the other hand, tiny growth temperature effects ($\sim 3\text{K}$ under-shooting of wafer temperature after down-cooling) gave a clear bowing response with $\sim 4\text{km}^{-1}$ amplitude, as **Fig. 1** shows. These measurements prove again how critical temperature deviations for MOCVD growth processes are!

EpiTT goes GaN MBE!

EpiTT has become a standard tool for GaN MOCVD. Now we are proud to report its successful application for GaN MBE, too. Recently Dr. Yvon Cordier at CRHEA in the South of France carried

out *in situ* measurements of GaN growth on Sapphire, Si and GaN templates in a Riber Compact 21 using LayTec's **EpiTT** sensor. The results were a great success! Dr. Cordier was especially enthusiastic about the performance of the true temperature measurements (TT). Using the method of Emissivity Corrected Pyrometry, temperature was determined with the accuracy better than 1 K for all types of substrates used! Effects of stray light from the MBE sources were almost completely suppressed by a new optical set-up! A true temperature and 633nm reflectance measurement for GaN/AlN on Sapphire is shown in **Fig. 2**.

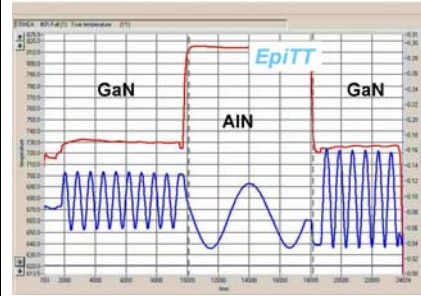


Fig. 2: *In situ* measurements of GaN/AlN growth on Sapphire in a Riber Compact 21 performed by LayTec's **EpiTT** sensor. Red curve - True Temperature; blue curve - reflectance at 633nm.

Interestingly, previous band edge measurements of heterostructures on Silicon had failed, despite good results for GaN grown on templates. The fundamental reason is that temperature measurements through band edge in case of heterostructures suffer from strain-induced band edge shifts and Fabry-Perot signal distortion.

Further details of these measurements will be presented at the next international MBE conference. Dr. Cordier and we at LayTec are looking forward to perform additional curvature measurements by **EpiCurve** at CRHEA soon.

For more information please contact info@laytec.de or call +49.30.39 800 800.

Win an MP3 player!

To even improve our service, we sent a questionnaire to all LayTec customers via email recently. All users are kindly asked to fill out the form by March 15 to take part in a lucky draw for three MP3-players! If you are a user of any LayTec's *in situ* monitoring system and did not receive the form, please contact support@laytec.de! Only one form per *in situ* tool is required. Thanks for your help and cooperation!

Events

You can meet us on the following workshops and conferences:

13 - 17 March, 2006
APS March Meeting
Baltimore, Maryland, USA
www.aps.org/meet/MAR06/

26 - 31 March, 2006
DPG Dresden
Dresden, Germany
<http://dresden06.dpg-tagungen.de/index.html?lang=de>

28 - 30 March, 2006
LED Expo China
Shanghai, China
www.led-expo.com.cn/

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