Characterization of 2D materials growth

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Graphene and other 2D materials opened exciting new device and materials possibilities. Thermal chemical vapor deposition (CVD) is among the most promising methods to synthesize 2D materials[1], that are characterized with several powerful (but time consuming) ex-situ techniques like Raman spectroscopy, atomic force microscopy, etc. LayTec's in-situ metrology systems EpiCurve TT enable close control of key deposition parameters like wafer temperature and surface coverage. Therefore, they can accelerate the research on 2D materials and the scale-up of the related industrial production processes. In the following, we will present some results on the analysis of in-situ reflectance, temperature and wafer bow data as measured with an EpiCurve TT during the deposition of Graphene in an AIXTRON reactor. Moreover, we will discuss the advantages of a mapping station combining very accurate Raman spectroscopy [2] with white light reflectance (WLR) measurements, for a fast analysis of wide area samples.

References

[1] Xin Jiat Lee et al., J Taiwan Inst Chem Eng, Volume 98 (2019) 163-180
[2] W.-J. Zhao et al., J. Am. Chem. Soc., 133 (2011) 5941-5946

Figures

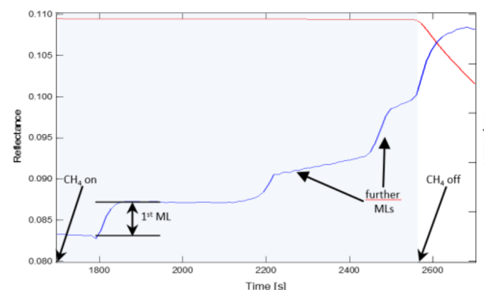

Figure 1: 405nm Reflectance measured in-situ, during the deposition of 3ML of graphene on sapphire allows direct determination of the graphene coverage

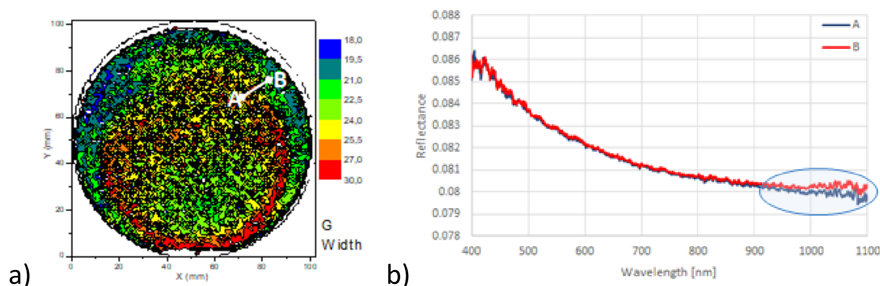

Figure 2: 1 ML graphene on a 100mm sapphire wafer. Comparison between width of Raman G peak (a) indicating the strain of the layer, and WLR at two position A and B with different strain (b): the NIR portion of the spectra correlates with the strain state of the layer.