ONYX Graphene and 2D Materials Inspector

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Abstract

Graphene production is increased every day, but current characterization techniques are only able to inspect it in nano-scale (confocal Raman Spectroscopy, TEM, AFM) or macro scale (optical microscopy, DC conductivity) [1]. Thus, das-Nano has developed a system based on THz technology, Onyx Graphene and 2D Material Inspector, which covers the gap between both techniques allowing the ultra-fast determination of the existence of in-homogeneities in the material. Onyx is able to characterize several materials such as CVD graphene (mono-, bi-, multilayer, flakes, doped), PEDOT; ITO, NbC, ALD samples or spin coated photoresins by a repeatable and reproducible measurement process.

Onyx is a THz-based system [2] for quality inspection of 2D materials which works in reflection configuration (as a difference with the state of the art methods [1-3]) and provides a conductance map of the full surface of the sample. The obtained results present a good correlation with current methods (Van der Pauw technique) [4].

Figure 1 shows the conductance maps of three samples. These sample were characterized using Raman Spectroscopy and optical microscopy. Based on this characterization, sample A and B were classified as good samples and sample C as bad sample. Onyx inspection results show that sample C is the bad one and sample B is the good one. The problem is sample A. The average conductance value is similar to sample B but its homogeneity is very different. Note that Onyx inspection takes less than 5 minutes while Raman inspection takes 3 days to obtain a comparable measure.

Onyx Graphene and 2D material inspector allows a very-fast (over 30 mm^2,@ 1 mm^2 resolution in less than a minute, spatial resolution of 100 µm) and non-destructive evaluation of the full surface of a 2D material sample. Furthermore, Onyx guaranties the repeatability and reproducibility of the results.

References

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[4] J. D. Buron,et al., “Electrically Continuous Graphene from Single Crystal Copper Verified by Terahertz Conductance Spectroscopy and Micro FourPoint Probe”, Nano Letters, Volume 14, **Issue 10** (2014) pp 6348-6355.

Figures

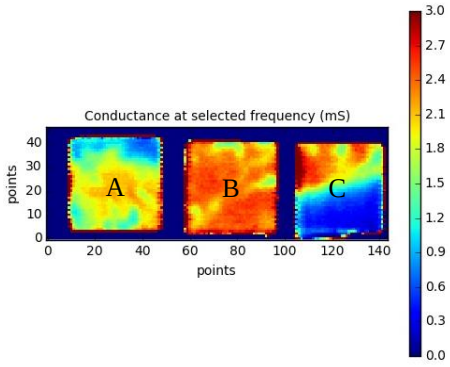

Figure 1. Conductance maps of several samples of CVD Monolayer Graphene at 0.5 THz