Terahertz time-domain spectroscopy for electrical homogeneity mapping of 2D materials

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Terahertz-time domain spectroscopy (THz-TDS) is a rapid and non-destructive measurement technique for accurate scanning of the electrical properties of graphene [1,2]. By raster scanning samples in the focal plane of the THz beam it is possible to map the DC conductivity, scattering time, carrier density and mobility of graphene without physical contact to the sample [1,2]. Values obtained from THz-TDS measurements are benchmarked against micro four point probe (M4PP) and Hall measurements in order to compare and verify extracted values [1-6].
Here, we will highlight recent results on reflection-mode THz-TDS measurements [4] and THz-TDS measurements of graphene on polymer [5] and as-grown on SiC where ~30x variation in conductivity is observed (figure) [6]. We will further highlight new application scenarios for THz-TDs measurements of 2D materials.

References

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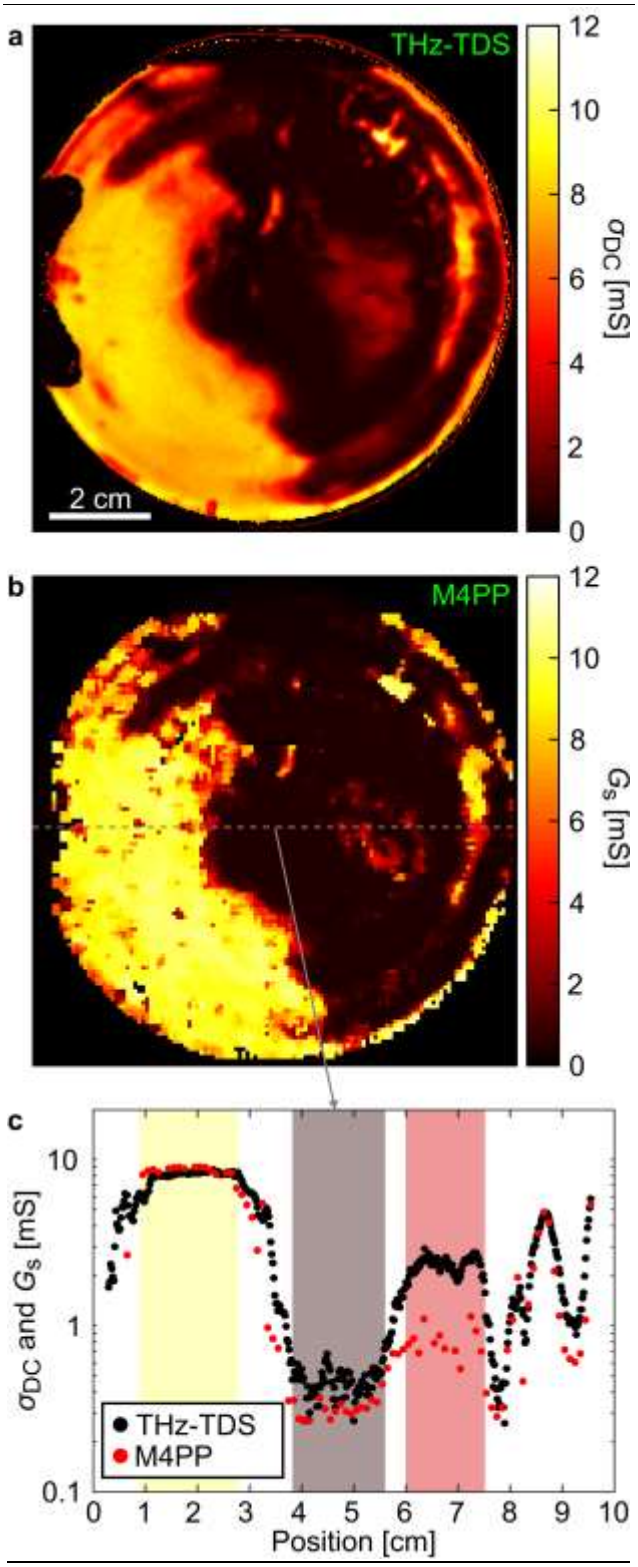

Figure 1: σ_{DC} and G_s map of graphene on a four inch SiC wafer measured by (a) THz-TDS and M4PP. (c) Line plot of σ_{DC} and G_s from THz-TDS and M4PP measurements following the line in (b). [6]