Weak localization in wafer-scale graphene

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Previous studies have shown evidence of the subtle interplay amongst the elastic (intra-valley and intervalley) and inelastic scattering lengths to determine weak localization (WL) phenomena in graphene [1]. Further investigations of WL can help to understand the scattering mechanisms in the different types of graphene. In the present contribution, we will start by reviewing the current understanding of WL in graphene and will subsequently proceed to show the experiments performed in our lab to investigate WL phenomena in wafer-scale graphene. In one set of experiments, metal contacts are first grown and CVD-graphene is later transferred and structured to produce devices such as those shown in Figure 1 (left). In another type of experiments, epitaxial graphene grown on SiC is first structured into Hall-type bars and, subsequently, metal contacts are grown as shown in Figure 1 (right). The magnetotransport results indicate the presence of WL below T~50 K in both types of samples [2]. From the obtained results, the relevant scattering lengths and their temperature dependence have been determined. The possible origin of the different values of the scattering lengths found for different types of graphene and different experimental situations will be discussed.

References

[1] E. Mc Cann et al. *Phys. Rev. Lett.* **97**, 146805 (2006); F. V. Tikhonenko et al. *Phys. Rev. Lett.* **103**, 226801 (2009)

[2] I. Serrano-Esparza et al., manuscript in preparation

Figures

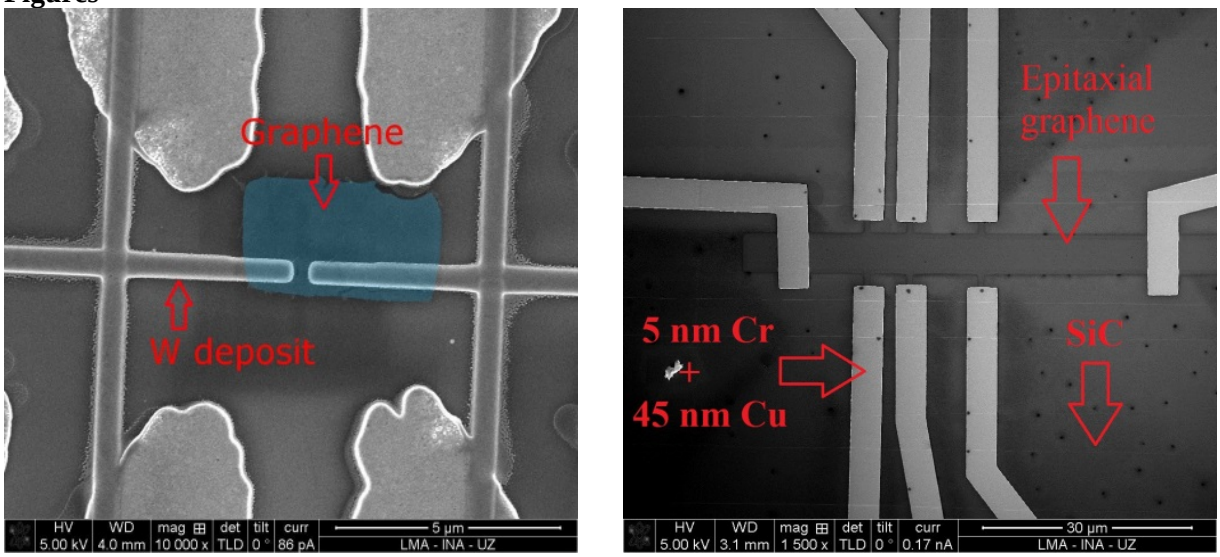

Figure 1: LEFT: SEM imaging of CVD-graphene on top of metal contacts. RIGHT: SEM imaging after lithography to establish metal contacts to epitaxial graphene grown on SiC substrate.