Graphene transfer for the remote epitaxy of III-V materials

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The remote epitaxy is a recently introduced method that could allow III-V substrate re-use after growth [1], and therefore drastically reduce the cost of the currently most efficient solar cells. This method relies on the growth of a III-V material, on a III-V substrate itself covered by few-layers of 2D materials. Previous reports show that thin enough 2D materials prevent the formation of chemical bonds between the deposited material and the substrate, so that exfoliation is later possible, while still allowing the formation of mono-crystals aligned with the substrate [1].

The first step to perform the remote epitaxy is therefore the transfer of 2D materials on a III-V substrate. In particular, large scale graphene is usually synthetized on copper or SiC and needs to be transferred. In this contribution, we investigated the transfer of graphene obtained by CVD on Cu, by a wet and a dry transfer method. The wet transfer route is widely used in the literature, but present the disadvantage to introduce graphene wrinkles and polymer residues that would be harmful for epitaxy. The dry method has the potential to provide cleaner surfaces, but we have found that adhesion on the target substrate is weak, requiring an additional hot-pressing step. The resulting graphene quality is therefore reduced (figure 1). Characterisation of the transferred graphene by Raman spectroscopy, optical and electronic microscopy will be presented.

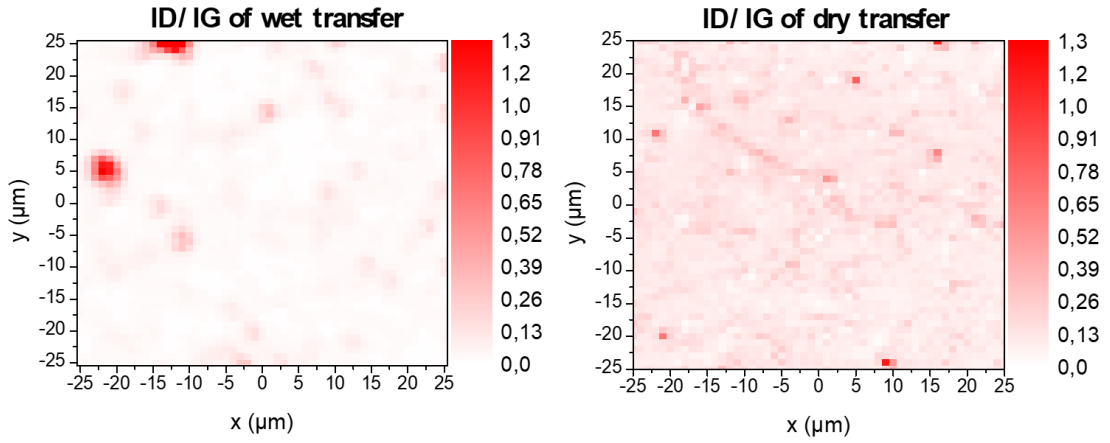

Figure 1 ID/IG Raman peaks ratio of graphene transferred by the wet and dry methods. The larger averaged ratio for the dry method indicates a low-quality graphene.

[1] Y. Kim *et al.*, "Remote epitaxy through graphene enables two-dimensional material-based layer transfer," *Nature*, vol. 544, no. 7650, pp. 340–343, Apr. 2017