A robust graphene platform for biorecognition

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Abstract
Technologically useful and robust graphene-based interfaces for devices require the introduction of highly selective, stable and covalently bonded functionalities on the graphene surface, whilst essentially retaining the electronic properties of the pristine layer. This work demonstrates that highly-controlled, ultra-high vacuum covalent chemical functionalization of graphene sheets with a variety of molecules, among them para-aminophenol and p-aminothiophenol [1]. These systems are subsequently used for the development of hybrid nanostructures by attaching metal nanoparticles and nuclei acid aptamers, as depicted in Figure 1. The impact of this controlled surface functionalization methodology on the electrical properties of graphene was evaluated by studying graphene solution-gated field-effect transistors (gSGFET), which were measured prior to and after functionalization with p-aminothiophenol.

REFERENCES

[1] R. Bueno et al, Nature Comm. 8, (2017) 15306.
[2] R. Bueno et al ACS OMEGA,4 (2019),3287.

FIGURES

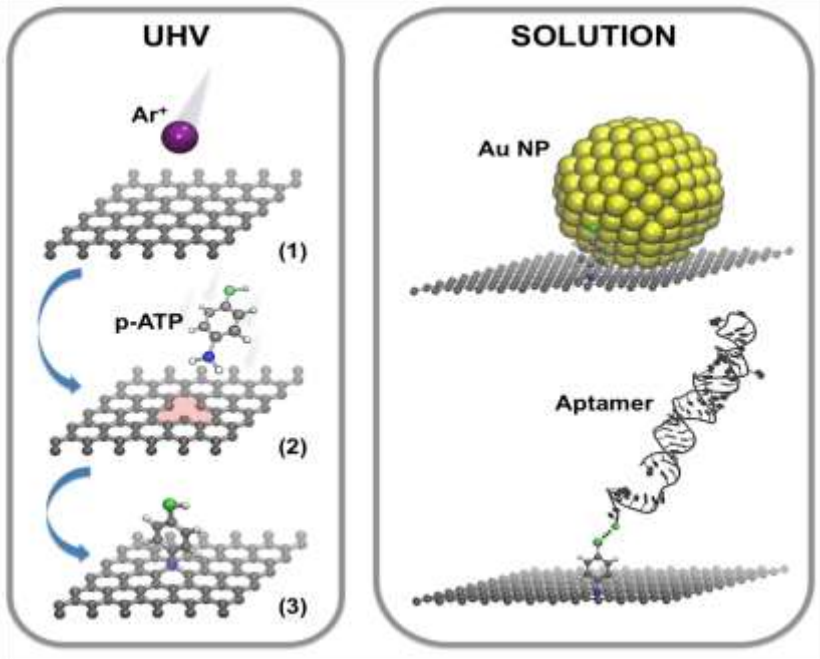

Figure 1: Left) Basic mechanism for the covalent functionalization with p-ATP that serves as a link to molecules of interest. It takes place in Ultra High Vacuum. Right) Example of linked molecules: gold nanoparticles and Aptamers . This second step takes place in solution