PHD GRANT

Shiba states in superconducting graphene

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Yu-Shiba-Rusinov states emerge from the competition between superconductivity and magnetism. Our goal is to study these states in graphene. Though bare graphene does not exhibit intrinsic superconductivity, one can make it superconducting using the proximity effect. The nature of this peculiar state in graphene has been little explored up to now. Studying its response to magnetic impurities should provide insights into its robustness, in particular through the study of the spatial variations of the electronic density of states associated with Yu-Shiba-Rusinov states.

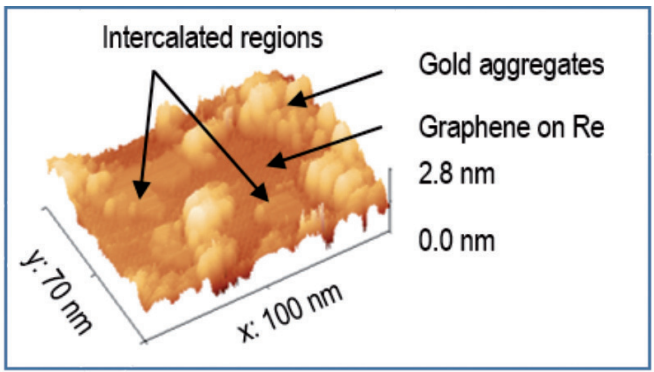

Fig.1: Scanning tunnelling microscopy image (T = 50mK)

We grow graphene directly on a superconductor, namely rhenium. Unfortunately, the coupling between graphene and its substrate, which guarantees a good proximity effect, also leads to the formation of covalent bonds which kill most of the interesting properties of graphene. In order to recover two-dimensional free-standing graphene – a great asset for the observation of Yu-Shiba-Rusinov states with a low temperature scanning tunneling microscope - gold is locally intercalated between graphene and rhenium (Fig.1). Our next step is to deposit magnetic molecules on this platform.

OUTCOMES

Poster presentations: IOT workshop, Grenoble, France, 2017; RJP, Grenoble, France, 2017; 2D@Grenoble, Grenoble, France, 2017; GDR Graphene & co, Aussois, France, 2017; Journée ARC6, Grenoble, France, 2017.

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