Work Offers (PhD/Post-doc)

PhD position : Electronic and atomic structure of graphene nanoribbons

A major technological challenge is the finding of a new material for the post-silicon CMOS era. Epitaxial graphene on silicon carbide is a promising candidate for industry as it is grown on top of a technological substrate. Moreover, the electronic properties of graphene on silicon carbide are particularly close to those of ideal graphene as we have observed [1]. Graphene ribbons are interesting for circuitry but when obtained by electronic litography their edges are rough and their transport properties are polluted by disorder-related problems. Our collaborators in GeorgiaTech (Atlanta, USA) have developed a routine to obtain high quality ribbons by combining lithography and an annealing procedure [2]. Moreover, we have also observed that with these ribbons it is possible to settle metal-semiconductor-metal junctions on a continuous substrate of graphene [3].

In this PhD (funded by an ANR project), we will study the atomic and electronic structure of both nanoribbons and metal/graphene interfaces by photoemission and scanning tunneling microscopy/spectroscopy. The student will also participate to sample preparations and STEM measurements at Laboratoire de Physique des Solides (Orsay).

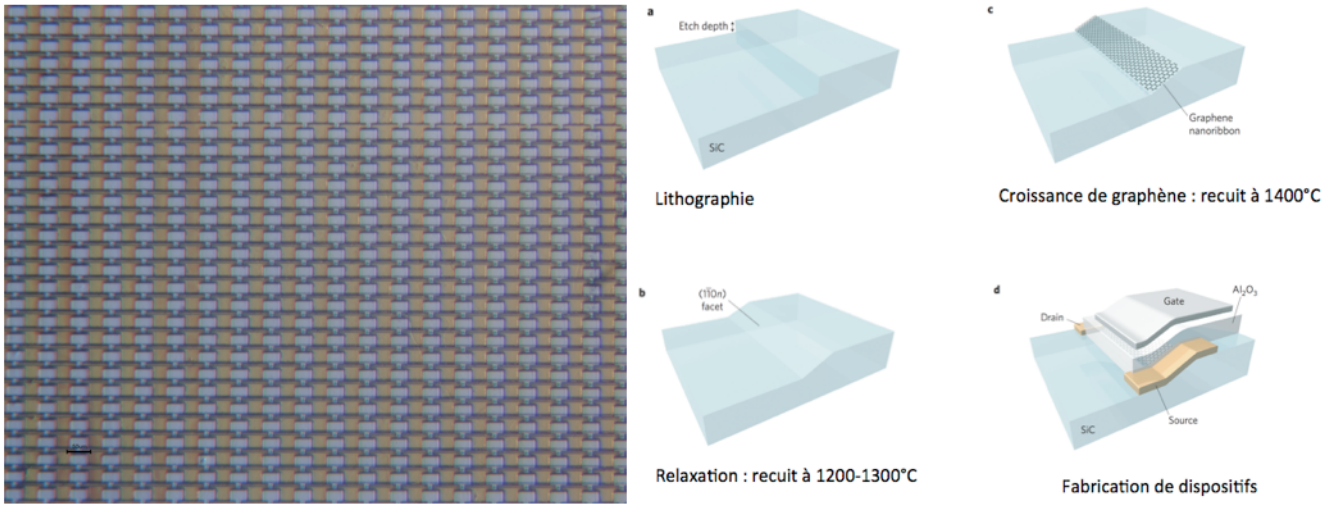

Figure 1. – (Left) Standard lithographic techniques plus an annealing procedure allows producing high-quality graphene nanoribbons on certain crystallographic facets of SiC. (Right) Matrix of transistors with this type of ribbons. Scale bar : 20 m.

[1] M. Sprinkle *et al*., Phys. Rev. Lett. **103**, 226803 (2009).

[2] M. Sprinkle *et al*., Nature Nanotech **5**, 727 (2010).

[3] J. Hicks *et al*., Nature Phys. **9**, 49 (2012).

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Post-doc position : Calculations on graphene ribbons

A post-doc will be hired for 18 months to work on the numerical simulation of the electronic structure and transport properties of nanoribbons. The calculations will all be performed using a tight-binding description. The post-doc should thus be familiar with standard tight-binding descriptions of electronic structure, in particular for graphene and related structures. In view of the intensive numerical calculations of transport properties he/she should also be familiar with concepts of quantum electronic transport and with informatic languages (Fortran) and programming on numerical platforms.

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