Master Matériaux

Ingénierie des matériaux - Ingénierie des polymères - Ingénierie des surfaces

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Titre :
In-situ electron microscopy of graphene and metal-graphene contacts.

Résumé :
The work of this practical course (*stage*) concentrates on the observation of structural and electronic changes in nanomaterials at the atomic level. This is done by using a modern high-resolution transmission electron microscope that is located at the IPCMS. A dedicated specimen stage allows to contact nanostructures electrically and so to carry out electrical measurements at the same time as the observation of the objects in the electron microscope. The technique has recently been used by our group to fabricate narrow ribbons of single-layer graphene and to measure their electronic properties. This is of high current interest in view of the applicability of graphene in electronic devices. Measurements on such narrow sheets with monoatomic thickness and with such a precise control of the structure have not been carried out before. It is therefore highly desirable to continue this project in a *stage* that could be followed later by a PhD work on the same subject.

The following points can be studied in this *stage*:
1. the in-situ generation of graphene ribbons from different precursor materials in the microscope;
2. the contacting of these graphene layers by different metal electrodes;
3. the measurement of current-voltage curves.

Of particular interest are the relations between the structure of the graphene ribbons and their electrical behaviour. Furthermore, crystallographic defects that can be generated by the electron beam in the microscope should change the electrical conductivity. This has never been studied experimentally until now and is therefore of high interest, in particular since several theoretical predictions have already been published.

Veuillez préciser pour quel(s) parcours vous proposez votre sujet et mettez une croix devant la(les) spécialité(s) correspondante(s) :

- ☒ **Ingénierie des matériaux / Physique des matériaux**
- ☐ **Ingénierie des matériaux / Chimie des matériaux**
- ☐ **Ingénierie des polymères**
- ☒ **Ingénierie des surfaces**