Séminaire P2M

Mardi 10 mai 2022 à 11h, salle Patrick Alnot (4.014)

Dr. Nataliya Kalashnyk
Laboratoire de Physique des Matériaux et des Surfaces (LPMS),
CY Cergy Paris Université

Towards control of structure and physical properties of graphene nanoribbons

The ongoing rise and quick headway in interdisciplinary research fields covering supra-molecular chemistry, materials, and surface sciences have caused an extraordinary transformation in the assembling of novel electronic devices that have remarkable functionalities like low weight, flexibility, stretchability, and transparency. Specifically, the main target has been to substitute conventional top-down strategy, i.e. photolithography, since it requires a multi-step process. Thus, many attempts are done to fabricate such devices by bottom-up methods that involve (i) the self-assembly and the reaction of functional molecular building blocks at surfaces and (ii) the growth of vertical and lateral hybrid van der Waals heterostructures composed of 2D materials.

Here I will describe two projects in which I was involved in the last years (i) intra- and intermolecular reactions on surfaces, leading to the formation of either new molecular species or polymeric structures, and (ii) the elaboration of functional hybrid multilayered van der Waals heterostructures from graphene and self-assembled supramolecular 2D crystals.

Based on these two expertises gained during my previous research I propose a project for my insertion in your laboratory entitled «Towards control of structure and physical properties of graphene nanoribbons ». The first objective of this project is to use three original methods for the growth of various GNRs structures from specific molecular precursors on both metal and insulating substrates. The syntheses will allow to shape the width, edges, doping and porosity of these GNRs, and to perform a fine-tuning of their electronic properties. The second objective is to develop several methods for transferring GNRs onto desired surfaces depending on the nature of the growth and target substrates. The third objective is to study the physical properties of GNRs before and after their transfer with up-to-date surface-sensitive techniques.