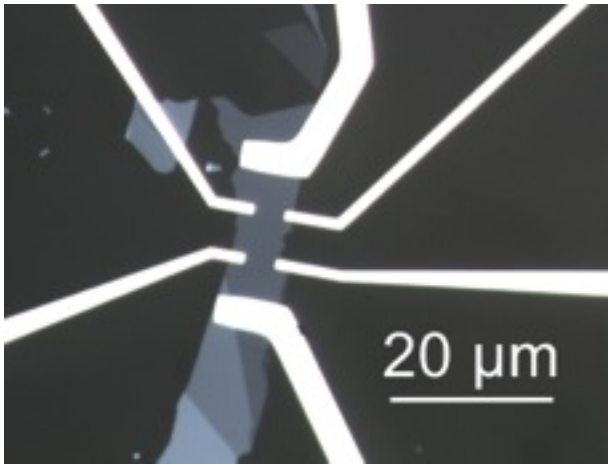
Labex MATISSE

Axe 4

Nom: BISCARAS
Prénom: Johan



Hosting laboratories, teams and and thesis supervisors names:

1. IMPMC, team MIMABADI (mineralogie and magnetism at low dimensionality), supervisor Abhay Shukla

Research project (10 lines)

Titre : 2D materials, transport properties and nanoscale spectroscopy.
We study the properties of 2D materials like graphene and ultra-thin films of layered semi-condcutors (e.g. : MoS_2, InSe,...) that we fabricate with our original technique of electrostatic bonding to a glass substrate.
We modify the transport properties of these materials by tuning the electrostatic doping induced by the substrate. The large range of doping accessible by this technique allows to induce phase transitions in the 2D material (insulator to metallic, and metallic to superconductor).Another part of this project is the developpement of super-resolved Tip-Enhanced Raman Spectroscopy (TERS) to study edge states and defects (intrinsinc or electrochemically induced in collaboration with E. Maisonhaute and I. Lucas from LISE lab) of these 2D materials.

Summerize your scientific results & impacts (5 lines)

We have shown that our electrostatic doping tehcnique allows efficient doping of several materials like graphene and MoS_2. We have measured the superconducting properties at very high doping of the latter.
We have also tested the TERS technique in our laboratory with resolution of 30 nm (l/20 super-resolution)

Main key facts

submitted papers :

- « A High performance graphene/few-layer InSe photo-detector » Zhesheng Chen, Johan Biscaras and Abhay Shukla. Nanoscale **7**, 5981 (2015)
- « Space charge doped graphene: a high performance transparent conducting electrode on a glass substrate » Andrea Paradisi, Johan Biscaras, Abhay Shukla (submitted)