

## Master 2 in Nano-characterization, Toulouse, France

*LAAS-CNRS, Paul Sabatier University*

### Unveiling the nucleation mechanisms of III-V nanowires on silicon

Nanowires (NWs) are a new material class in the world of semiconductors with potential applications for electronics, photovoltaics, sensors and many other areas. So far, their synthesis using a bottom-up approach has been the most successful these 10 last years since it allowed the combination of materials previously incompatible both axially and laterally. Among the different possibilities, III-V based materials benefit from the most interesting intrinsic properties such as direct bandgaps, high mobilities, and large wavelength coverage. Unfortunately their nucleation on silicon suffers randomness incompatible with the CMOS technologies. In order to scale-up and integrate advances III-V functionalities onto CMOS, this issue needs to be overcome.

This Master 2 research topic will focus on studying the nucleation of the III-V nanowires on Silicon. Nanowires will be synthesized in a Molecular Beam Epitaxy reactor (MBE) using Gallium or Indium as a catalyst. The influence of the substrate orientation ( $\langle 001 \rangle$  or  $\langle 111 \rangle$ ) and the preparation of the substrates (wet etching, dry etching, annealing) will be studied; and their influence on the III-V // Silicon interface will be characterized via Scanning Electron Microscopy (SEM) and Transmission Electron Microscopy (TEM). Finally, a nucleation model, explaining the observed phenomenon, will be developed.

Potential candidates should demonstrate knowledge or experience in nanoelectronics, thin film deposition, materials science, material characterization and/or nanofabrication.

#### Recent publications:

*J. Wang et al., Nano Letters 2013, 13(8), 3802-3806.*

*S. Plissard et al., Nanotechnology 2011, 22(27), 275602.*

Contacts:     [sebastien.plissard@laas.fr](mailto:sebastien.plissard@laas.fr)

[cfuccio@laas.fr](mailto:cfuccio@laas.fr)