2015-2016

Internship proposal (Master 2 or final internship) at the LMGP

Title: ZnO nanonet fabrication for electrical sensing

Context

The field of the *in situ* molecular diagnosis for applications connected to the environmental safety either to the personalized medicine at the bedside of the sick person (point of care diagnosis) is rapidly growing. For that purpose, it is crucial to be able to fabricate decentralized, portable, quick and reliable sensors while being cheap and easy to use. A strategic way is the development of chemical sensors or biosensors based on the label-free electrical detection of molecules or biomolecules. It requires to fabricate nano-transducers constituted of sensitive semiconductive nanomaterials. The latter should be stable, cheap and exhibiting a highly developed surface in order to provide a maximum of sensitivity. If the Si nanowires are the most commonly studied nano-transducers, Si exhibit some instabilities in liquid solutions which can be detrimental for long term applications. In this context, ZnO nanowire randomly oriented networks also called "nanonets" are new and promising candidates. The internship will focus on their fabrication, characterization and assessment of their sensing performance.

Project

-In a first step, the student will fabricate ZnO nanonets from vertically grown ZnO nanowires using an assembling and transfer techniques. Nanonets with various morphologies and densities will be prepared. Basic technological and characterization steps will be performed to assess the morphological and electrical characteristics of nanonets.

- In a second step, the student will study the sensing performances of the ZnO nanonets either for pH or for biological molecule detection (DNA…).

Competences

If possible : nano-characterization, nanophysics, nanochemistry, nanobiology
French language required.

Time and place

Web site of the lab: http://www.lmgp.grenoble-inp.fr/

PhD possible : YES

Internship stipend : 554€ per month

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References :

"Silicon nanonets for biological sensing applications with enhanced optical detection ability"
P. Serre, V. Stambouli, M. Weidenhaupt, T. Baron and C. Ternon, Biosensors and Bioelectronics 2015