



Title: Composites nanoparticles/liquid crystals for new kinds of photovoltaic devices

Keywords: nanoparticles, assembly, spectrophotometry, electrical properties

Scientific description:

We propose in this Master 2 internship project to build a new kind of photovoltaic device that is interesting for its potential low-cost but also for the modulations of its properties as a function of temperature and magnetic fields that will become possible thanks to the liquid crystal matrix.

Our group at INSP has shown how to strictly orientate ribbon-like networks of grain boundary defects in thin films of liquid crystals [1]. We have also shown that nanospheres or nanorods of gold or of semiconductors are confined within these defects and form ordered and self-oriented ribbon-like monolayers of nanoparticles [2]. We thus propose in this internship to work in order to build long ribbons of nanoparticles that would be formed between two electrodes. Ultimately the ribbons would be formed by n-type nanoparticles for which we would be able to analyse combined optical and electrical properties. This project would thus pave the first step for a new kind of photovoltaic device but also would enable us to understand the role of the nature of the ligand and of the order of the nanoparticles in the ribbons on the induced electrical properties.

Techniques/methods in use: The main work of this internship will be to (1) synthesize n-type nanoparticles and conductive ligands for these nanoparticles (2) Thin film fabrication (3) Characterization of the electronic properties of the nanoparticle ribbons.

Applicant skills: no particular skills

Industrial partnership: N

Internship supervisor(s) (name, email, phone, webmail):

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Internship location: Jussieu campus, Tower 22, 4th floor

Possibility for a Doctoral thesis: Y/N (specify if already financed) Y