

POST-DOCTORAL POSITION

Duration: 2 years.

Location: Marseille (France).

Starting: December 2022 / January 2023.

Field: Chemistry / Physical Chemistry.

Funding: ANR project "***Spin-state Manipulation in Semiconducting Nanoparticles***"

SPIMAN (ANR-21-CE09-0027- 01)

Description:

Within the frame of the three-years project **SPIMAN** funded by the French National Research Agency (ANR), a two-years post-doctoral position is offered at the **IM2NP** laboratory, Marseille (France). The aim of this project is to magnetically functionalize the surface of semiconducting nanoparticles (**NPs**) with quasi-stable optically excited paramagnetic centers displaying interesting spin dynamics, with potential application magnetic memories or quantum computing.

The first studied system will be the hydrothermally grown ZnO **NP** for which growth residual acetate on surface generates methyl (CH₃) radical when subjected to a 400 nm (sub-band gap) illumination, whose spin 1/2 is detected by Electron Paramagnetic Resonance (**EPR**) under 120 K. Then, the surface will be functionalized with various photo-active molecules, and the interaction between these latter and the native surface- and core-defects will be studied. Other kind of polar **NPs** will be studied (TiO₂, ZrO₂, ...), and different combinations of **NPs**, optical excitation wave length, growth conditions and adsorbed photo-active molecules will be investigated.

For each system, the magnetic response will be characterized by continuous wave (cw) and pulse **EPR**, as well as other relevant techniques (TEM and SEM imagery, NMR, double resonance, Raman ...) for temperature down to liquid helium, in order to search for the best stable magnetic state and spin coherence time.

The final goal being to completely monitor these states, a combination of different optical lasers and electron injection/pumping excitation will be used to enhance or to quench the optically excited surface magnetic states, by designing new setups compatible with the standard Bruker **EPR** spectrometers.

Candidate:

We are searching for highly motivated candidates with recent (under three years) *Ph. D* in Chemistry or Physical Chemistry, with as most as possible skills in the following fields: organic and inorganic chemistry, low-temperature growth methods of nanostructures, chemical characterization (Raman, NMR, ...), surface functionalization, photo-chemistry, thin-film preparation, spin-coating **NPs** deposition, cw and/or pulse **EPR**. The recruited candidate will be responsible for samples preparation and their magnetic and chemical characterization. He also must be interested in the learning (if needed) of advanced **EPR** techniques, in the study of non-equilibrium spin dynamics at the nanoscale, and to develop new setups for adding external excitations to the conventional **EPR** spectrometers.

Application:

Please send a CV, three recommendation letters from your thesis supervisor and two professors, a letter containing a brief description of your thesis and skills, together with your interest and motivation in the project to adrien.savoyant@im2np.fr.