



NanoTrans

PhD project proposal and applicant profile

“Novel techniques for electrokinetic measurements in colloidal suspensions”

Project description and objectives

Today measuring colloidal charge/electrophoretic mobility of nanoparticles in suspension remains a challenge in many circumstances: low electrophoretic mobility samples, high concentration samples, high conductivity medium, etc. In order to circumvent these limits, we propose to investigate theoretically and experimentally a new highly sensitive optical technique based on Differential Phase Optical Low Coherence Tomography (DP-OCT). After a first step of bibliographic research, the candidate will thoroughly study the theory and physical principles of DP-OCT in order to determine accessible performances of this technique. In parallel, an experimental work will be started with the assembly of a DP-OCT set up in Cordouan’s lab. The candidate will systematically explore sensitivity, reproducibility, concentration range, spatial resolution, applied voltage, and detection volume of the experimental system. The performances of DP OCT will then be compared with Laser Doppler Electrophoresis (LDE) developed in Cordouan and acoustophoresis technique developed at the PHENIX-UPMC lab. At a final stage we will collaborate with other nodes (CNRS, JÜLICH, UZH) to demonstrate the capability of the system to perform high-resolution electrophoretic mobility measurements in various colloidal suspensions: weakly charged colloids, concentrated suspensions, nonpolar and low dielectric constant solvent, etc.

Candidate missions:

The candidate will be mainly responsible for:

- Bibliographic research on DP OCT technique and its application
- Experimental implementation of the technique in the lab: bread board assembly
- Experimental study of colloidal systems with the DP OCT setup and comparison with existing techniques (LDE and acoustophoresis)
- Presentation of his work during Nanotrans workshops/events, and in international conferences.
- Writing scientific papers for publications in dedicated reviews.
- Academic goal: PhD Thesis defense at the end of the project

Applicant profile and skills:

- Educational level : Master 2 in Physics and Chemistry
- Strong background in colloidal science and Nanoparticles
- Experimental and theoretical skills on characterization techniques for nanoparticles/colloidal suspension (DLS, LDE, acoustophoresis, TEM, conductivity, etc)
- Communication skills: ability to write articles and make posters



- Fluent in English (French is optional)
- Ability to work in a small team
- Autonomy and proactivity

Project Environment:

The PhD work will be achieved in Cordouan Technologies (*) premises under the supervision of David Jacob –PhD & Technical director with temporary secondments in Nanotrans partner’s labs (PHENIX UPMC, univ of Jülich, etc)

Doctoral school: University Pierre & Marie Curie in Paris (UPMC)

Location: BORDEAUX -PESSAC (F33600) France

Duration: 36 months

Financing: the PhD fellowship is entirely financed by the ITN –H2020 initiative within the Nanotrans project.

() Cordouan Technologies (www.cordouan-tech.com) is a SME Company based in Bordeaux – Pessac (France); we are specialized in the design, industrialization and fabrication of instrumental solutions for nanoparticle and colloid characterization (Size distribution, charge).*

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