



Engineer / Post-doc position

Job title :	3D luminescence micro-tomography in microfluidic biomedical device
Location :	Laboratoire PMC - Ecole polytechnique, Route de Saclay, 91128 Palaiseau, France
Contact :	Jongwook Kim / Thierry Gacoin
e-mail :	jong-wook.kim@polytechnique.edu / thierry.gacoin@polytechnique.edu
Homepage :	https://pmc.polytechnique.fr
Starting date :	Position available from February 2022

Context

We have been developing anisotropic nanocrystal phosphors that can be used as orientation probes [1,2]. They have versatile uses, for instance, to track complex motion of motor-proteins, to analyse self-assembly of colloids, and to monitor dynamic flow profiles in microfluidic devices. The latter exploits the tendency of rod-shaped nanocrystals orienting under flow-shear, on which we established a 3D tomographic microflow imaging [3]. Currently we are running a project applying this technique on cellular bio-fluidics and medical devices.

Project

This project aims to develop a rapid and accurate diagnostic tool of '*ciliary dyskinesia*' of human bronchial cells which is one of the main causes of the chronic respiratory diseases (ex. asthma, bronchitis, sinusitis). Our research consortium has discovered that the *shear stress* applied by *cilia* is the key index quantitatively figuring the patients' pathology. We are thus developing microfluidic shear-analysis device based on our tomographic flow-imaging technique using the nanoprobe [3]. We will design the optimized microfluidic device, confocal microscopy instrument, and the diagnostic analysis procedure in collaboration with researchers in biomechanics at INSERM and medical doctors at UPEC hospital. An ultimate goal is to provide a user-friendly diagnostic package accessible in hospitals.

The main tasks of the engineer or post-doc researcher are:

- 1) Polarization-resolved scanning confocal fluorescence micro-spectroscopy.
- 2) Microfluidic experiments and analysis
- 2) Instrumentation of the optical and electronic setups.
- 3) Data analysis and programming for automatized measurement interface.

Candidate and Position

The candidate should have a background in optical physics, materials science and the discipline relevant to the theme of the project, with a profound experience in confocal fluorescence microscopy and optical imaging. The additional experience in microfluidics and in using Labview and Matlab would be appreciated.

The position is funded for one year. A renewal for the second year can be considered depending on performance, employment authorization, and mutual agreement.

The evaluation of the candidates will start immediately; the position will remain open until filled. Application should include a CV, list of publications, motivation letters, and the names/contact details of references.

References

- [1] Kim et al. *Nature Communications*. 12 (1), 1-10 (2021)
- [2] Chaudan et al. *J. Am. Chem. Soc.* 140, 9512-9517 (2018)
- [3] Kim et al. *Nature Nanotechnology*. 12, 914-919 (2017)