



Post-doc position

Job title :	3D luminescence micro-tomography in microfluidic kinetic energy harvesters
Location :	Laboratoire PMC - Ecole polytechnique, Route de Saclay, 91128 Palaiseau, France
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Homepage :	https://pmc.polytechnique.fr
Starting date :	Position available from May 2020

Context

We have been developing anisotropic nanocrystal phosphors that can be used as orientation probes [1]. 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 [2]. Currently we are running a project applying this technique on cellular bio-fluidics, and launching a new government-funded (ANR) project tackling the issue of 'sustainable energy' by implementing an *in-situ* microfluidic-and-electrochemical analysis in kinetic energy harvesting devices.

Project

This project aims to develop a portable kinetic energy harvesting cells based on the electrochemical power generation originating from the ion-sweeping phenomenon under the electrolyte flow [3]. We will design the cells together with the partner of the consortium at Nanyang Technological University (NTU, Singapore), and will study the correlation between the non-stationary flow profile adjacent to the electrode surface and the electrochemical response during the energy harvesting cycles. This project is highly interdisciplinary combining the fields of nanoparticle science, microfluidics, optics, electrochemistry, and device application, which will be carried out by collaboration of researchers with diverse expertise.

The main tasks of the post-doc researcher are:

- 1) Polarization-resolved scanning confocal fluorescence micro-spectroscopy on microfluidic devices.
- 2) Instrumentation of the optical and electronic setups.
- 3) Data analysis and 3D visualization.
- 4) To learn and perform basic electrochemical manipulations.

Candidate and Position

The candidate should hold a PhD in physics, materials science, fluid mechanics or a discipline relevant to the theme of the project, with a profound experience in fluorescence microscopy and imaging. The additional experience in nanoparticle science and in using Labview and Matlab would be appreciated. Good English communication skills and no-restriction for work travels to Singapore are required.

The position is funded for one year and renewable for the second year depending on performance, employment authorization, and mutual agreement. An annual salary starts at about €34,000, which is subject to applicable taxes and deductions.

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, and submitted to: jong-wook.kim@polytechnique.edu

References

- [1] Chaudan et al. *J. Am. Chem. Soc.* 140, 9512-9517 (2018)
- [2] Kim et al. *Nature Nanotechnology.* 12, 914-919 (2017)
- [3] Jung et al. *Nano letters.* (2020) DOI: 10.1021/acs.nanolett.9b05029