Post-Doc position – 18 months – Labex iMUST Lyon, France

Characterization of synthetic polymers

at the single molecule scale by nanopores

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Nanopores are present in the biological world to ensure various critical functions (control of the cellular osmotic pressure, screening and remodeling of proteins, transmembrane signalization). They can also be generated from membranes of different synthetic materials. The objective of this project is to follow the translocation of synthetic polymers through such nanopores in order to develop an original experimental platform for their characterization at the single molecule scale.

The post-doc researcher will be in charge of the synthesis and analysis (NMR, SEC, spectroscopies) of fluorescent polymer chains with a controlled size and composition, notably by using the RAFT polymerization technique. This will be performed thanks to the expertise already acquired at the Laboratoire d'Ingénierie des Matériaux Polymères (IMP) [1]. In addition, she/he will conduct translocation experiments of these polymers through synthetic nanopores. Thanks to a near-field optical detection [2] developed at the Laboratoire de Physique de Lyon (LPENSL), the recorded signal will then be used for the molecular characterization.

We are thus seeking for a motivated young scientist interested by research at the interface between polymer chemistry and single molecule physics. This ambitious project will allow her/him to acquire new skills within a multidisciplinary environment. The proposed 18-month contract is funded by the Lyon Laboratoire d'excellence (Labex) iMUST. It is expected to start in September 2021 and will be conducted within IMP and LPENSL that are both located in the Lyon area.

References:

[1] Experimental requirements for an efficient control of free-radical polymerization via the RAFT process. *Macromol. Rapid Commun*. 2006, 27, 653; Toward New Materials Prepared via the RAFT Process: From Drug Delivery to Optoelectronic, In *Handbook of RAFT Polymerization*, Wiley-VCH: 2008; pp 483; Patent *FR 3 020 634*, 2014 ; Advanced Fluorescent Polymer Probes for the Site-Specific Labeling of Proteins in Live Cells Using the HaloTag Technology. *ACS Omega* 2019, 4, 12841.

[2] Zero-mode waveguide detection of flow-driven DNA translocation through nanopores. *Phys. Rev. Lett*. 2014, 113(2), 028302; Zero-Mode Waveguide Detection of DNA Translocation Through FIB-organised Arrays of Engineered Nanopores. *J. Microelectronic Eng*. 2018, 187, 90.