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Post-doctoral position

## Probing nanomechanical behavior of individual molecular machines using atomic force spectroscopy

**Labs :** Laboratoire de Réactivité de Surface (LRS) & Laboratoire Interfaces et Systèmes Electrochimiques (LISE), Sorbonne Université, 4 place Jussieu, 7525 Paris.

**Funding :** Agence National de la Recherche (ANR)

**Speciality :** materials science; surface science

**Keywords :** nanomachines, surface functionalization, atomic force microscopy (AFM), single-molecule

### Objective

Molecular machines are supramolecular systems for which a movement between at least two entities can be triggered by a stimulus. They are expected to play a major role in future smart devices in various fields (electronics, biology or sensing among others). In this framework, we are interested in Pillar[5]arene-containing daisy chains that result from the association of self-complementary monomers bearing both a threadable macrocycle (host) and a linear thread (guest).<sup>1,2</sup> They will be used to develop new molecular machines in which a chemical input is converted into mechanical motions leading to a reversible contraction/extension, mimicking a molecular muscle. The molecular machines will be grafted onto solid surfaces using specific protocols, which will be evaluated by means of surface science techniques, including X-ray photoelectron spectroscopy (XPS), IR and Raman spectroscopy. A particular attention will be dedicated to the grafting procedures used to immobilize individual molecules and characterized them at the single-molecule level.<sup>3</sup> The intramolecular interactions leading to the contraction/extension will be probed by using dynamic force spectroscopy.

### Candidate background

The candidate must hold a PhD in chemistry, physical chemistry, materials science, surface science or closely related field, and have a strong interest for surface functionalization and scanning probe microscopy-based techniques. The candidate should submit a curriculum vitae, a summary of her/his research activities and a list of her/his publications.

### Contacts

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<sup>1</sup> P. R. Ashton, I. Baxter, S. J. Cantrill, M. C. T. Fyfe, P. T. Glink, J. F. Stoddart, A. J. P. White, D. J. Williams, *Angew. Chem. Int. Ed. Engl.* 1998, 37, 1294-1297.

<sup>2</sup> M. C. Jiménez, C. Dietrich-Buchecker, J. P. Sauvage, *Angew. Chem. Int. Ed. Engl.* 2000, 39, 3284-3287.

<sup>3</sup> M. Steffenhagen, A. Latus, T. Minh Nguyet Trinh, I. Nierengarten, I.T. Lucas, S. Joiret, J. Landoulsi, B. Delavaux-Nicot, J.-F. Nierengarten, E. Maisonhaute, *Chem. Eur. J.* 2018, 24, 1701-1708.