



Post-doctoral position in physical chemistry / biochemistry
Influence of material properties on the adsorption of proteins inspired by natural glues

Keywords: biomimicry, protein self-assembly, surface plasmon resonance imaging.

- **Context and mission**

Tissue adhesives or surgical glues are interesting alternatives to sutures and staples because they can be applied quickly, with almost no material and are relatively painless. The adhesives currently in use have certain disadvantages such as immunogenic properties, poor bioadsorption or unsuitable mechanical properties. These disadvantages encourage the search for alternative products, particularly those inspired by nature. Indeed, several animals produce very powerful adhesives necessary for their development or survival in a wet environment or in the air. Some arthropods are able to glue to various materials thanks to a protein complex resembling the composition of current surgical glues. The adhesion mechanism seems to be linked to the self-assembly of proteins secreted by the animal, forming a network of fibers onto the material surfaces. In the IMBM team of the materials and physical engineering laboratory (LMGP), we are particularly interested in protein-surface interactions.

To understand the functioning of sticky proteins, we produce and purify in the laboratory recombinant proteins inspired by these natural glues. In order to study the influence of material surfaces on protein adhesion, it is important to be able to analyze and compare the adsorption of proteins on a wide range of surfaces with varied physicochemical properties. For this purpose, the CREAB team of the Molecular systems and nanomaterials for energy and health (SyMMES) laboratory has developed biochips for the multiplex study of the adsorption of molecules (proteins) by Surface plasmon resonance imaging (SPRi).

The successful candidate will be in charge of the study of the protein-surfaces interactions. This project involves the following tasks:

- production and purification of the recombinant proteins
- optimization of the fabrication of SPR biochips consisting of various surface properties
- conducting SPRi experiments to study interaction between various surfaces and proteins

The project will take place between the LMGP and SyMMES laboratories.

- **Candidate profile**

We look for a candidate with a PhD in biochemistry and/or physical chemistry for biological sciences with previous experience on protein folding, and/or on protein-protein and protein-material interactions. The candidate should be able to work in an international team, be autonomous and have very good oral and writing skills.

- **The laboratories and the teams**

The Material and Physical Engineering laboratory (LMGP) (www.lmgp.grenoble-inp.fr/en) at Grenoble has an international reputation in the fields of nanomaterials and structured thin film materials and their applications in different fields, among which biology and biomedical engineering. LMGP has outstanding material characterization capacities that are routinely operated (SEM, TEM, Xray diffraction, ellipsometry, XPS, IR and Raman spectroscopy etc). The Interfaces between Materials and Biological matter (IMBM) team have a long-standing expertise in investigating protein adsorption and aggregation phenomena at interfaces using real-time surface-sensitive techniques (SPR, QCM, IR) and microscopy and developing custom-made molecular tools and screening assays.

The Molecular systems and nanomaterials for energy and health (SyMMES) laboratory (www.symmes.fr/en) at CEA Grenoble aims at developing basic research on themes with strong societal issue: zero-carbon energy, information and communications technology (ICT), biotechnology and human health. To do this, the SyMMES explores the design, synthesis and study of architectures and innovative and original functional materials, guarantees of the relevance of future research proposals from the laboratory. The laboratory is also interested in the reactivity and properties of biomolecules, providing a novel approach to biological questions. The Chemistry for the Recognition and Study of Biological Assemblies (CREAB) team has recognized expertise in biosensor/biochip/electronic nose development in view of applications in the field of health technologies, environment, etc.

- **Contacts**

Send C.V., cover letter and recommendation letters to:

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The position is available for 15 months starting from: September 1, 2023.

Application deadline is: June 15, 2023.