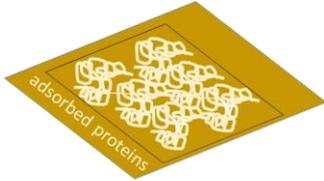


## 2024-2025 Internship proposal at LMGP Lab.

### Protein adsorption and molecular competition at material surfaces

#### Context

Proteins are amphiphilic molecules that can adsorb non-specifically on numerous surfaces, leading to the establishment of an irreversibly bound protein layer.



In the medical, environmental and food sector, the colonization (fouling) of surfaces by molecular and cellular adsorption causes numerous problems with wide ranging consequences. Infections caused by catheter colonization with harmful bacteria are an example of an important and recurrent health threat.

At LMGP, we are studying the molecular behavior of proteins at material surfaces in the context of different applications, like therapeutic formulation stability, anti-fouling surface coatings etc.

The quantification of the adsorbed protein mass is tricky because the amounts can be very small ( $\text{ng}\cdot\text{cm}^{-2}$ ). Therefore, it is necessary to develop in-situ experimental protocols that allow signal amplification with enhanced sensitivity. Competition between different proteins/ molecules for adsorption at material surfaces is also difficult to study because of its dynamic and local restriction to a few nanometers above the surface.

#### Project description

In this project, we propose to develop two experimental protocols to quantify protein adsorption on surfaces:

- by fluorescence using fluorescently labelled proteins (antibodies)
- by colorimetry using enzyme activity (HRP, urease, ...)

The project objectives are the following:

1. Using fluorescence/absorbance spectroscopy, develop and optimize a quantification protocol for surface-adsorbed proteins (calibration curve, sensitivity, dynamic range, etc). If necessary and when applicable, fluorescence microscopy can also be used.
2. Exploit fluorescence quenching/dequenching to study molecular competition on material surfaces.

Different plastic materials and in-house LMGP material surfaces will be tested for their protein adsorption potential.

#### Scientific environment

The candidate will work within the LMGP, Materials and Physical Engineering Laboratory, in the IMBM Team.

LMGP Web Site: <http://www.lmgp.grenoble-inp.fr/>

#### Profile & requested skills

We look for a highly motivated student with a good background in protein biochemistry. Previous experience with enzyme catalysis and fluorescence spectrometry is a plus but not absolutely essential. Good writing and presentation skills are required.

**Contact :** To apply, please send a CV and motivation letter to [marianne.weidenhaupt@grenoble-inp.fr](mailto:marianne.weidenhaupt@grenoble-inp.fr)

**Gratification:** Internship allowance will be provided

