

2021-22 M1 Internship proposal at LMGP

Study of the interactions between functional amyloids and material surfaces

Abstract: Sticking to material surfaces is a widespread phenomenon that is used by many organisms to anchor their body or external structures permanently or temporarily on solid surfaces. This is often achieved via secreted proteins (and other organic molecules) that adsorb and self-organize on solid surfaces.

The functional properties of such secretions rely on complex, dynamic protein-surface interactions that involve both protein and material surface characteristics. At LMGP, we are interested in surface-triggered assembly of proteins into functional amyloid fibers. We are able to combine expertise in material science with protein biochemistry in order to explore the phenomena that govern protein adsorption at solid-liquid interfaces.

Project description: The aim of the project is to study the self-assembly of a class of peptides called phenol-soluble modulins (PSMs) produced by the pathogen *Staphylococcus aureus*. PSMs are well-known virulence factors but may also play a role in bioadhesion and biofilm formation. To tackle these issues, synthetic peptides will be used and their affinity towards different surfaces (e.g., hydrophilic, hydrophobic...) as well as their amyloid formation kinetics will be studied.

Methodology: After mastering the preparation of these hydrophobic peptides, PSM interactions towards surfaces will be assessed by performing some of the following techniques: surface plasmon resonance (SPR), quartz crystal microbalance (QCM), isothermal titration calorimetry (ITC), or adsorption isotherms. The most suitable techniques will be chosen in function of the availability of material surfaces developed by other LMGP lab members. The amyloid formation kinetics will also be measured by using analytical techniques such as Thioflavin T fluorescence and dynamic light scattering.

Objectives: The goal of this internship is to improve our understanding on how PSMs interact with material surfaces.

Scientific environment: The candidate will work within the LMGP, Materials and Physical Engineering Laboratory, in the IMBM team. She/he will access a large variety of characterization techniques, either in the lab or at the Consortium des Moyens Techniques Communs. Located in the heart of an exceptional scientific environment, the LMGP offers the applicant a rewarding place to work.

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

Profile & requested skills: We look for a highly motivated student with a strong background in physical chemistry and a clear interest in biology topics. Basic practical knowledge in chemistry and molecular biology are required. The student should be able to work in a team,

have excellent writing skills (reports, presentations...) and a good knowledge of spoken and written English.

The internship dates are April-July 2022

Subject could be continued with a PhD thesis: no

Allowance: Internship allowance will be provided

CONTACT: Send a C.V. and a motivation letter to laurent.marichal@grenoble-inp.fr and to marianne.weidenhaupt@grenoble-inp.fr