2025-2026 Internship proposal at LMGP Lab.

"Characterization and optimization of a lipid system designed for the efficient incorporation of NhaA"

Context

The **context** of this M2 internship lies within a biotechnological project focused on the development of a 3D compartmental system made by liposomes, in which we utilize the transmembrane protein NhaA, an electrogenic sodium/proton antiporter that enables ion exchange across the membrane. By reconstituting NhaA within the lipid bilayer membrane of the liposomes the system is capable of producing and storing energy.

Project description

The **goal** of this M2 internship is to assist and contribute to the characterization and optimization of a lipid system designed for the efficient incorporation of NhaA into lipid membrane.

The **objectives** of this M2 internship are to *(i)* investigate the lipid composition of the system and tailor it to optimize NhaA incorporation using QCM-D; *(ii)* analyze and compare QCM-D data acquired in the presence and absence of NhaA; *(iii)* correlate QCM-D results with data obtained using complementary techniques performed by other members of the team, such as ellipsometry and microfluidics; and *(iv)* characterize functional NhaA mutants produced by other members of the team through an in vitro activity assay based on electrophysiological method.

Methods to be utilized:

Screening of lipid composition for optimization of NhaA incorporation

- Preparation of lipid mixtures and protein solutions
- Characterization of supported lipid bilayer formation using QCM-D
- Investigation of NhaA incorporation into the lipid bilayer
- Investigating the role of the different lipid in optimizing the incorporation of the transmembrane protein

Data analysis

- Analysis of QCM-D
- Analysis of QCM-D data combined with imaging-ellipsometry data

In vitro activity assay – Electrophysiology

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Tasks and **skills** expected from the intern:

- Capability to work autonomously in a multidisciplinary and international environment
- Good level of English (spoken, written expression)
- Data processing
- Report on the results

Scientific environment

LMGP (Laboratory of Materials and Physical Engineering, http://www.lmgp.grenoble-inp.fr/) is a joint research unit (UMR 5628) of CNRS and Grenoble INP within Université Grenoble Alpes, located at the Minatec site in the PHELMA (Physics, Electronics, Materials) engineering school buildings.

This M2 internship will be conducted within an ERC Advanced Grant (https://cordis.europa.eu/project/id/101142533).

Profile

- Master 2 in physics, chemistry, biomedical engineering or related fields
- Particular interest in data analysis, protein-lipid interaction
- It is desirable to have some experience and knowledge in data analysis

Contacts

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