ANR PROLIFIC
PhD PROJECT 2022-2025

Title of the PhD project: Structural mass spectrometry approaches for the characterization of membrane protein / lipid interactions in new solubilizing environments.

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Summary of the project:
One of the emerging features of the protein-lipid interactome is that certain lipid molecules can selectively bind to specific sites on membrane proteins (MPs) playing key roles in folding and stability of MPs or acting as allosteric regulators of protein function. The tools to study these interactions remain scarce and often invasive despite the progress made in this field. The PROLIFIC project aims at 1) developing a new generation of mild polymeric surfactants allowing extracting, in a detergent-free manner, MPs with their associated lipids directly from the cell membrane and overcoming the issues encountered with the other already existing polymers, 2) identifying by mass spectrometry approaches the native lipids bound to MPs using as models several members of the pentameric ligand-gated ion channel (pLGIC) superfamily known to be exquisitely sensitive to lipids, and 3) characterize the influence of protein-lipid interactions on the structural integrity, conformational equilibrium and function of these MPs by state-of-the-art structural mass spectrometry approaches combined with functional assays. The new polymers developed in this program will therefore diversify the toolbox available for MP studies.
The objective of this PhD will be to develop structural methods, mostly based on native mass spectrometry (nMS) and H/D exchange mass spectrometry (HDX-MS) for the characterization of MP/lipid interactions.

Keywords: mass spectrometry, native MS, Ion Mobility MS, HDX-MS, structural analysis, membrane proteins, lipids.

Applicant profile: The candidate should have a background in analytical chemistry, mass spectrometry and/or structural biology. Prior experience in native mass spectrometry and/or MS-based membrane protein analysis would be highly valued. Applicants should provide evidence of academic performance, excellent English writing and communication skills, and a commitment to work on scientifically challenging problems. They must also have a taste for multidisciplinary teamwork.

Funding of the PhD: The PhD grant is supported by the ANR project PROLIFIC **for 3 years** starting from the 1st October 2022.

Send your CV and marks of your Master degree to sarah.cianferani@unistra.fr