



ANNE-LAURE FAMEAU

From France to Sweden



Project: **SENSOFOAM PROJECT: LIQUID FOAMS AS POTENTIAL SENSORS**

Research topic: **Chemistry**

Swedish Institution: **Chalmers University**

French Institution: **INRAE**

Dates of mobility: **15/08/20224 to 31/08/2024**

Program: **SFVE-A program 2024**

PRESENTATION

Dr. Anne-Laure Fameau studied Food Science before coming to soft matter during her thesis. She received her Ph.D. in Physical Chemistry from the University of Nantes in 2011. At the end of 2011, she obtained a permanent staff position at INRAE in Nantes. In 2015, she joined L'Oréal company in the Physical-Chemistry Department (Paris). She came back to academia at INRAE at the end of 2021. Her research interests are in the field of responsive soft materials based on lipids and green surfactants with a particular emphasis on foams and interfaces. She is currently working on using liquid foam as sensors. <https://www.linkedin.com/in/alfameau/>

ACTIVITIES IN SWEDEN

One of the main objectives of the SENSOFOAM project is the detection of bacteria by liquid foams. The chosen approach to achieve this aim is to detect extracellular enzymes produced by living bacteria, and not to detect directly the bacteria. The advantage of this indirect approach is that enzymes have a strong and specific activity which should increase drastically the sensitivity to levels relevant for practical applications. Our strategy is to detect enzymes activity *via* the use of enzyme-hydrolysable surfactants. By selecting carefully suitable cleavable surfactants, which typically include a weak bond into the surfactant's structure that can be broken down in a controllable and predictable way by a specific enzyme, we will be able to detect the presence of the said enzyme by monitoring the foam (e.g. quantity, stability) as sensor system. Cleavable surfactants will be chosen so that they are less efficient upon cleavage, thus, triggering change in surfactant effectiveness and foam production ability. To achieve this aim, Dr. Fameau visited Dr. Bordes from Chalmers University, since he is an expert recognized world-wide on cleavable-surfactant systems, including ester-based surfactants as well gemini surfactants [1-3]. During the stay, we identified together suitable surfactant's structure to design liquid foam as sensors for bacteria detection. We also wrote a review

on the topic of liquid foam as sensors and submitted this review. Dr. Bordes and Dr. Fameau also discussed future joint applications on this topic.

REFERENCES:

- [1] Stjerndahl, M., Lundberg, D., Chauhan, V., Bordes, R., & Holmberg, K. (2019). Cleavable surfactants: A comparison between ester, amide, and carbonate as the weak bond. *Journal of Surfactants and Detergents*, 22(5), 1139-1145.
- [2] Chauhan, V., Holmberg, K., & Bordes, R. (2018). A reverse degradation vs. temperature relationship for a carbonate-containing gemini surfactant. *Journal of colloid and interface science*, 531, 189-193.
- [3] Tehrani-Bagha, A., & Holmberg, K. (2007). Cleavable surfactants. *Current opinion in colloid & interface science*, 12(2), 81-91.