**Molecular predictors of macroscopic foam functionality of soy proteins**

J Purrini1, J Yang1  and E van der Linden1

*1Laboratory of Physics and Physical Chemistry of Foods, Wageningen University and Research, Bornse Weilanden 9, 6708, WG Wageningen, the Netherlands*

The poor applicability of plant proteins in food products is mainly due to the many unknowns of the protein ingredients. The unknowns in techno-functionality (e.g. foaming, emulsifying and gelling properties) hamper the decision making in product development, thus slowing down this process. These unknowns can be overcome by experimental testing the plant proteins’ techno-functionalities. Unfortunately, this process is both labor-intensive and time-consuming, requiring extensive measurements and analysis, thereby slowing down the development of novel foods. This project aims at finding molecular predictors that could facilitate the predictability of the foaming properties of soy proteins. Such molecular predictors could be hydrophobicity, solubility, degree of denaturation, and aggregate size, which can directly predict the macroscopic properties of proteins, through omitting the mesoscale analysis. To overcome the high workload in understanding the functional properties of proteins, the project aims to identify the minimal information necessary to predict the macroscopic functionality.

We study the molecular parameters that determine the foaming properties of soy proteins. Different extraction methods and conditions used during the extraction have shown that they result in proteins with varying composition, purity, and functional properties[[1]](#footnote-1). Therefore, we obtain lab-extracted proteins through various extraction methods, such as heating and drying methods. We then evaluate the molecular and foaming properties of these soy ingredients. Using statistical approaches, we find correlations between molecular parameters and foaming properties. The same molecular properties are found in commercial ingredients, which we use to validate these correlations. This project will discuss which molecular predictors should be analysed to accelerate decision-making in product development.

1. References:

   Yang, J., Mocking-Bode, H. C. M., van den Hoek, I. A. F., Theunissen, M., Voudouris, P., Meinders, M. B. J., & Sagis, L. M. C. (2022). The impact of heating and freeze or spray drying on the interface and foam stabilising properties of pea protein extracts: Explained by aggregation and protein composition. *Food Hydrocolloids*, *133*, 107913. https://doi.org/10.1016/j.foodhyd.2022.107913 [↑](#footnote-ref-1)