From Binding to Release: Tracking Plant-based Protein–Flavor Interactions in Sustainable Food Processing

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Have you ever wondered why some foods smell amazing when cooked, while others fall flat or even develop off-notes? The answer often lies in how flavor molecules interact with proteins — and whether they stay bound or get released during processing.

Our recent research shows that flavor molecules can bind to plant-based proteins in two ways: Non-covalent binding (temporary and reversible) & Covalent binding (strong and more permanent). While we have measured and distinguished these two binding types under controlled conditions, one big question remains: what happens to these interactions during real food processing, like heating, mixing, or pressing? Understanding this is crucial for designing better-tasting, and sustainable plant-based products.

In this project, we will dive into the dynamic world of flavor–protein interactions under realistic food processing conditions by:

- Creating protein–flavor model systems
- Applying food-relevant treatments like heating (e.g. cooking a burger), mixing, and pH shifts
- Analyzing the release and retention of both covalently and non-covalently bound flavors using headspace-GC-MS and LC-MS technique

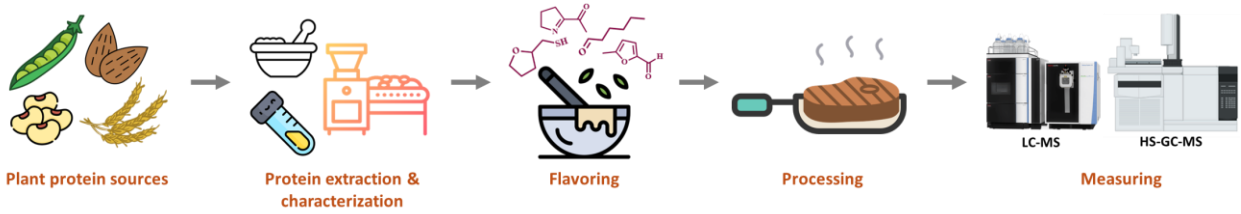

Figure 1: Schematic for flavor binding and release analysis in vegan plant protein products.

This thesis is a collaboration between the Organic Chemistry group (ORC) and Unilever, offering experience in both academic and industrial settings at the Helix (ORC lab) and Hive buildings (Unilever).

Who are we looking for?

- MSc or BSc students in: Molecular Life Sciences / Food Technology or related fields
- Interested in flavor chemistry, protein analysis, or analytical method development
- Motivated to connect lab research with real-world applications in sustainable foods

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