

## Delubrication by plant proteins: Understanding and addressing using colloidal technologies

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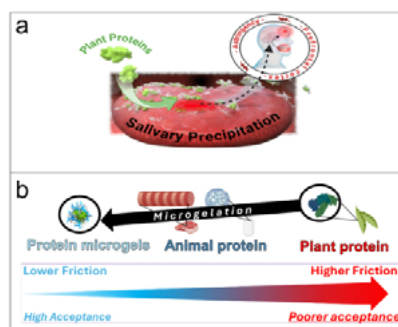
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Oral lubrication plays a critical role in food perception and consumer acceptance, yet it remains an underexplored dimension in food innovation. Astringency, a dry, rough mouthfeel resulting from poor oral lubrication, is a major sensory barrier to the acceptance of plant-based proteins, with its underlying mechanisms still poorly understood. We present a multiscale investigation into plant protein-induced delubrication, integrating sensory evaluation (n = 100), neural imaging via functional near-infrared spectroscopy (fNIRS; n = 29), and cellular assays to reveal how salivary protein-protein hydrophobic interactions leads to astringency and increases oral friction.

By understanding these tribological principles in food, including *in vitro* friction measurements on 3D-printed tongue-like surfaces, we demonstrate colloidal technology solutions such as microgelation and polysaccharide self-assembly that can reduce or remove astringency mouthfeel. Remarkably, these microgel colloids, composed of up to 95% water, achieve ultra-lubricating properties comparable to fat, improving not only plant protein application but with calorie reduction possibilities. These oral tribology led approaches have catalysed innovation, including the formation of a university spin out company, *Microlub*, which reimagines food design based on lubrication rather than taste alone. These findings underscore the critical role of oral tribology in sensory perception and offer a pathway to enhance the palatability, acceptance and health aspects of sustainable protein products.

### Keywords:

Plant protein, Sensory, Microgels, Sustainable protein, Tribology, Neural imaging



*a) The issue of plant protein astringency resulting from protein-protein hydrophobic interactions in the mouth b) A solution for plant protein astringency in microgelation processing underscoring the importance of oral tribology in food design for the adoption of alternative protein foods*

### References:

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