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Sesame proteins for microbubble foams

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Microbubble engineering is one of the emerging scientific topics, due to the numerous potential applications in medical science and foods.[1] Most of the cases, complex materials have to be used as stabilizers, therefore the formation of microbubble foams with natural ingredients is a challenging field. Moreover, plant protein-stabilized foams have attracted considerable research interest due to their sustainable production and potential technology applications.[2]

In this work, highly efficient, green fractionation practices have been developed for producing sesame seed isolate, containing 96 wt% proteins. Physico-chemical characterization of the isolate showed that it is mainly comprised of relatively low molecular weight hydrophobic proteins, soluble at alkaline pH values and ionic strengths above 0.25 M.

The adsorption behaviour of sesame proteins at air-water interfaces was investigated by employing static and dynamic surface tension measurement techniques. Sesame proteins exhibit an outstanding ability to drastically decrease the surface tension, even at very low concentrations. Furthermore, their presence in aqueous solutions at very low concentrations such as 0.06 wt% was enough to produce stable microbubble foams, by ultrasonication. The foam stability was evaluated by monitoring the evolution of bubble size. The results pointed to a remarkable stability of the sesame seed foams, which retained 25% of their initial volume even 28h after their production.

Finally, all the above research has given insights in the mechanisms behind foam stabilization by sesame seed proteins, such as interfacial asorption and lamella viscosifying, This work could have direct impilications in the production of sophisticated, health promoting and stable aired products.

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2. Nikiforidis, C. V., Ampatzidis, C., Lalou, S., Scholten, E., Karapantsios, T. D., & Kiosseoglou, V. (2013). Purified oleosins at air-water interfaces. Soft Matter, 9 (4), 1354-1363.