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Design, synthesis and stress-testing of novel phytochemical nanoemulsions with augmented stability

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Design, synthesis and stress-testing of novel phytochemical nanoemulsions with augmented stability

R. Salama, Dr. A. Banerjee, Dr. J. Binder, and Prof. J. F. Trant

Phytochemicals such as THC and CBD are being studied extensively for their anti-inflammatory, analgesic, anti-emetic, and psychoactive properties [1]. They are, however, soluble in lipids, rather than in water, which makes it difficult for us to prepare aqueous phase tinctures, *etc.* containing these phytochemicals, which are commonly used as nutraceutical supplements [2]. We have used hop extract as a model for phytocannabinoids, formulating emulsions with ~100 nanometer-sized droplets of the phytochemical coated with a food-grade surfactant, and dispersed in water *via* high pressure homogenization [3]. In the emulsion phase, lipid droplet sizes and zeta potentials have been measured in order to evaluate the stability of the nanoemulsions. The nanoemulsions were then subjected to changes in pH, temperature, and additional electrolytes to study the impact of these stressors on lipid phase droplet sizes and zeta potentials, which help us to predict the stability of these nanoemulsions under a variety of conditions. This study is expected to help us create stable nanoemulsions of lipophilic phytochemicals for commercial usage in the nutraceutical industry.

[1] Bruni N., Pepa C.D., Oliaro-Bosso S., Pessione E., Gastaldi D., Dosio F. *Molecules*, **2018**, *23*, 2478.

[2] Shin G.H., Kim J.T., Park H.J. *Trends Food Sci. Technol.*, **2015**, *46*, 144.

[3] Zhu Z., Wen Y., Yi J., Cao Y., Liu F., McClements D.J. *J. Coll. Interfac. Sci.*, **2019**, *536*, 80.