

Manufacture of Uniform Emulsions Using Membrane Emulsification Methods

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Summary

Membrane emulsification methods have been developed to produce size-desired uniform emulsions in a wide range from nanometer/submicron to a few hundred microns. To date use has been for research in the cosmetic and dairy sector. The drop-by-drop nature of membrane emulsification determines the emulsion size and uniformity are less dependent on formulations and highly reproducible, and can be transferred to various complex structures. New work reported in this paper demonstrates the feasibility of a pilot scale semi-continuous crossflow membrane emulsification rig with a ceramic membrane used for beverage emulsion manufacture. Potentially, the monodisperse submicron emulsion ($\sim 0.75 \mu\text{m}$) produced not only meets the size requirement for beverages, but could also be significantly beneficial to increase emulsion stability by limiting Ostwald ripening, which is more significant than coalescence in the emulsion destabilization of gum acacia stabilized beverage emulsions. The paper also demonstrates how uniform coarse emulsions (ranging from approximately 100 to 800 μm) were manufactured using a rotating membrane emulsification method. In addition both coarse particulates of single/multiple emulsions and microcapsules can be produced from various formulations by using membrane methods, illustrating their versatility for research and production.