Accepted Manuscript

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PII: S0023-6438(18)30436-5

DOI: 10.1016/j.lwt.2018.05.022

Reference: YFSTL 7132

To appear in: *LWT - Food Science and Technology*

Received Date: 15 March 2018

Revised Date: 5 May 2018

Accepted Date: 7 May 2018

Please cite this article as: Raviadaran, R., Chandran, D., Shin, L.H., Manickam, S., Optimization of palm oil in water nano-emulsion with curcumin using microfluidizer and response surface methodology, *LWT - Food Science and Technology* (2018), doi: 10.1016/j.lwt.2018.05.022.

Optimization of palm oil in water nano-emulsion with curcumin using microfluidizer and response surface methodology

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Abstract

This study aims to produce and optimise palm oil-based nano-emulsion to encapsulate curcumin using microfluidizer and Response Surface Methodology (RSM). Encapsulation of curcumin is essential to overcome curcumin's poor bioavailability through the formation of nano-sized droplets in order to harvest its outstanding anti-inflammatory and anti-cancer medicinal properties. Among the parameters of concern are microfluidizer's pressure, number of cycles and surfactant concentration (Tween 80). Optimisations were performed by employing RSM. Characterisations were conducted for the droplet size, poly-dispersity index (PDI), zeta potential (ZP) and viscosity. Stable palm oil-based oil in water nano-emulsion encapsulating curcumin was achieved at a droplet size of 275.5 nm, PDI of 0.257, ZP of -36.2 and viscosity of 446 cP using microfluidizer. The optimized conditions were at 350 bar, 5 cycles and 1 wt.% surfactant. Optimized microfluidizer with the aid of RSM is deemed