

20th World Congress on

NUTRITION & FOOD SCIENCES

May 14-16, 2018 Tokyo, Japan

Encapsulation efficiency and stability of vitamin D₃ enriched emulsions using microfibrillated cellulose as an emulsifier

Wiphada Mitbumrung and Thunnalin Winuprasith
Mahidol University, Thailand

Microfibrillated Cellulose (MFC) was expanded cellulose prepared by hot alkali pre-treatment and mechanical force. Normally, MFC was extracted from agricultural sources so, this study used mangosteen rind for MFC production because it was a by-product from the food industry. MFC could be used as a natural emulsifier for encapsulation of fat-soluble vitamin in emulsion system. The aim of this study was to investigate the effect of MFC concentration on emulsion properties and stability. Oil-in-water (O/W) emulsion; oil phase (0.01% vitamin D₃, 9.99% soybean oil), aqueous phase (MFC, 10 mM phosphate buffer pH 7) was performed by using different MFC concentration (0.3, 0.5, 0.7% w/w) using a 2-stage high pressure homogenizer. Encapsulation efficiency, oil droplet size, color, ζ-potential, microstructure and creaming stability of the emulsion samples were measured. The result found that MFC concentration affected to emulsion properties and stability. The emulsion containing 0.3, 0.5 and 0.7% MFC expressed encapsulation efficiency 87, 93 and 96%, respectively. All emulsions exhibited mean droplet diameter in range 10 to 100 μm. The increasing of MFC concentration exhibited larger oil droplet, provided darker color and increased magnitude of ζ-potential. SEM micrograph showed MFC formed physical barrier around oil droplet which provided stability of emulsion droplets against coalescence. However, it was found phase separation at concentration 0.3% MFC but did not cream at concentration 0.5 and 0.7% MFC throughout 90 days.

Biography

Wiphada Mitbumrung has received her Bachelor's degree from Department of Biotechnology, Faculty of Science, Mahidol University, Thailand. Presently, she is a Master's degree student in Food Science for Nutrition program at Institute of Nutrition, Mahidol University. Her research interest is an application of natural hydrocolloid and application of emulsion for nutrient and non-nutrient delivery system.

baitoeybaity12934@gmail.com

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