

4th International Conference on **Nanotek & Expo**

December 01-03, 2014 DoubleTree by Hilton Hotel San Francisco Airport, USA

Nanoencapsulation technique for vitamin A protection in starchy flakes

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Vitamin A is essential for vision and ocular health, immune system development, and neurological function. Its deficiency is still observed, especially among children in the developing world. Vitamin A fortification of foods is a core strategy for fighting vitamin A deficiency since it cannot be synthesized *de novo*. However, vitamin A is poorly water soluble and highly unstable under ambient conditions. Consequently, it can be easily degraded during processing, transportation, storage, and digestion of fortified foods and hence significant losses of its activity and efficacy can occur. This study was aimed that improving vitamin A delivery following fortification of cassava flakes, an example of starchy foods. In this study, vitamin A (retinyl palmitate) was nano-encapsulated using a lipid based delivery system, i.e., nanoemulsion. This was combined with a further encapsulation technique using a carbohydrate-protein based delivery system. Vitamin A nanoemulsion had fine uniform droplets ($d < 135$ nm, PDI=0.03) and good stability (>30 days). TEM image showed that oil droplets remained intact following spray drying and rehydration of the encapsulated vitamin A. High recoveries of vitamin A was observed in spray dried capsules and cassava flakes following a baking process. The hedonic rating test results showed that sensory characteristics of the fortified cassava flakes were generally acceptable. The results imply that the nanoencapsulation technique developed could provide excellent vitamin A protection without impairing sensory characteristics of the fortified food. The technique will be potentially useful for delivering other functional lipophilic components/bioactives effectively, especially for food applications.

Biography

Hoerudin received his Doctor of Philosophy (PhD) in the field of Food Science from The University of Queensland, Brisbane, Australia in 2012. He is the research Group Leader of Biomaterial Technology at Indonesian Center for Agricultural Postharvest Research and Development, Indonesian Agency for Agricultural Research and Development (IAARD), Ministry of Agriculture of the Republic of Indonesia. Additionally, he is the Technical Team Leader of IAARD Nanotechnology Research Center for Food and Agriculture. His major research areas are (i) nanoencapsulation of bioactives, vitamin and mineral for development of functional foods, (ii) isolation, modification, characterization, and utilization of cellulose nanofibers for food applications, and (iii) nanoencapsulation of bio-based agrochemicals.

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