Natchanok Nukit 2014: Structure-Forming Processes of Solidified Physically Refined Rice Bran Oil. Doctor of Philosophy (Food Science), Major Field: Food Science, Department of Food Science and Technology. Thesis Advisor: Associate Professor Parichat Hongsprabhas, Ph.D. 127 pages.

This research investigated the characteristics of solidified rice bran oil (RBO) using different oleogelators, namely high-temperature melting fat, self-assembled surfactants and carbohydrate polymers. The RBO oleogel could hold liquid oil phase at the temperature above melting temperature of RBO (-)30 - 5 °C up to 90 °C depending on the oleogelators used and proper aging process. Using commercial mono, di-acylglycerol (MDG) (mainly palmitic esterified) and crude wax as the source of rice bran wax (RBW) could stabilize the structure of RBO-RBW oleogel at 22 °C for more than 24 h. The mechanisms involved in stabilizing gel network were due to the ability of self-assembled of commercial MDG as well as fat crystal network of RBW, which resulted in the increased storage modulus, the increased viscoelastic transition temperature and the prolonged time for gel to change from elastic to viscous behavior. The ethyl cellulose (EC) network, however, could stabilize RBO-EC oleogel due to interactions between polymer and RBO to form of three-dimensional network. Raising concentration of EC from 2.5 to 3.25% increased storage modulus of RBO-EC oleogel. Such RBO-EC and RBO-RBW-EC oleogels could retain RBO and spices when the gel was used as pork marinade at 2 °C for 2 days by preventing salt and spice sedimentation. The RBO-EC and RBO-RBW-EC oleogels could withstand the temperature at 90 °C and further prevented sedimentation of salt and spices. Overall, the insights in the roles of different oleogelators in the formation of physically refined RBO oleogel could help forming solidified lipid structure holding liquid oil between 22 to 90 °C.

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