

Effect of Tripalmitin on Granular Crystals Formation in Bulk Model Systems of Fat Spread

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Fat spread made from palm oil has the problem that observed granular crystals during storage. Granular crystals will be cause of coarse and grainy texture. A number of researches have been performed to clarify the mechanism of the formation of granular crystals since it is important to control appearing granular crystal. These researches have revealed that the granular crystals have β form, and tripalmitin (PPP) exists in a center of the granular crystals. However, the mechanism of the granular crystals formation with PPP is still obscure. The purpose of this study is to elucidate to how PPP effects on the formation of granular crystals in early stage of ripening of fat spread.

This study adopted a simple model. We used only palm and soybean oils as bulk phase for the experiments. Three types of samples contained different state of PPP were prepared; bulk oil containing 2 wt% crystalline PPP, bulk oil containing 2 wt% melt PPP, and bulk oil without additional PPP. The samples added PPP under and over the melting point of PPP are named as a bulk oil with crystalline PPP and a bulk oil with melt PPP, respectively. All of samples were stored at the cyclic temperature program, 7 °C for 12 h and 15 °C for 12h. The polymorphic form of crystals in the bulk oil was determined by X-ray diffraction (XRD). The number of granular crystals was counted by naked eyes.

In the XRD results, diffraction peaks showing β form appeared within 1 day in the bulk oil with melt PPP and the bulk oil without PPP. In contrast, with crystalline PPP, the same diffraction peaks appeared after 1 week. The number of the granular crystal confirmed by eyes from the bulk oil with melt PPP was the largest among them. The number of granular crystals confirmed by eyes from the oil with melt PPP was the largest among them. These results illustrate that the crystallization of PPP plays an important role in the formation of granular crystals. If PPP was added in to the bulk oil as melt, PPP could be crystallized and form a lot of nuclei in the bulk oil. Those PPP nuclei would promote the formation of the granular crystals.