

## 109th AOCS Annual Meeting 発表

題名 ; Multiple  $\beta$  forms of tripalmitin in different crystallization pathway

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Polymorphic transformation of fat crystals, such as fat bloom in chocolate, will be a cause of deterioration of foods. Therefore, it is important to understand polymorphic behavior of fat crystals. Tri-saturated triacylglycerol is known to have three polymorphs,  $\alpha$ ,  $\beta'$  and  $\beta$ . In addition, some researchers suggested the existence of extra structures. However, the details remain unidentified. Here we report that tripalmitin (PPP) shows different  $\beta$  forms depending on their crystallization history.

PPP was crystallized in  $\alpha$  or  $\beta'$  forms from melt, and then they were transformed into  $\beta$  forms ( $\beta_4$  from  $\alpha$ , and  $\beta_2$  from  $\beta'$ ) by solid-solid phase transition by gradually increasing temperature. Additional heat treatment was applied for further phase transformation to  $\beta_3$  and  $\beta_1$ .

The following results were obtained.

- 1) From the polarized microscopy, the  $\beta_2$  changed its morphology during transformation from  $\beta'$ , while  $\beta_4$  kept the same morphology as  $\alpha$  form.
- 2) From the X-ray diffraction measurement, we confirmed the  $\beta_4$  transformed into  $\beta_3$  ( $\alpha$  route) and  $\beta_2$  transformed into  $\beta_1$  ( $\beta'$  route) because  $\beta_4$  ( $\beta_2$ ) and  $\beta_3$  ( $\beta_1$ ) had different short spacing.
- 3) From the differential scanning calorimetry measurements, the order of melting points were  $\beta_4 < \beta_3 < \beta_2 < \beta_1$ .

These results indicated that PPP have four different polymorphs,  $\beta_4$  and  $\beta_3$ , which were transformed from  $\alpha$  form, and  $\beta_2$  and  $\beta_1$ , which were transformed from  $\beta'$  form.