Microscopic Approach of the Polymorphism of Tripalmitin and Tristearin

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The study of polymorphism and crystallization behavior of a pure lipid system has a great scientific importance as a means of achieving possible understanding of the involved phenomena, which will provide basic knowledge for directing the addition or removal of these compounds in different raw materials. Crystallization of tripalmitin and tristearin was evaluated by polarized light microscopy. Tripalmitin (PPP) at 25 °C crystallized quickly into the *α*-form. The *α*-crystallization process is determined by a fast heterogeneous nucleation. The *α*-form is characterized by a bright spherulitic pattern. The spherulites fit tightly together, which results in sharp and straight edges. The spherulite size is strongly dependent on the nucleation density and can vary considerably from one place to another in the sample. At 46 °C/24 h from isotropic melt, a dense packing of *β'*-spherulites is observed, but at 46 ºC/24 h via recrystallization of *α*-form a simultaneous production of *α* and *β'* crystals occurs. At 55 ºC/24 h from isotropic melt a change in spherulite structure occurs. The spherulites can be observed clearly and show a fibrous structure. The fibers are severely contorted but clearly run out ward radially. At 55 ºC/24 h via recrystallization of α-form can be observed *β*' and *β* crystals, but with predominance of *β*-form. The *α*-form of tristearin (SSS) at 25 ºC showed a similar microstructure of PPP, determined by a fast heterogeneous nucleation and characterized by a bright spherulitic pattern. At 59 ºC/24 h from isotropic melt, a grainy microstructure can be observed with high nucleation density. At 59 ºC/24 h via recrystallization of *α*-form results in β-crystals with large, leaflike lamellar structures. At 65 ºC/24 h from melt a simultaneous production of *α* and *β'* crystals still occurs. At 65 ºC from the *α*-form a less intense birefringent and more disordered *β*-form appears. These results indicate that the microstructures of PPP and SSS are strongly depended on whether the crystals are obtained via recrystallization from α-form or directly from the isotropic melt.

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