

Two-stage Recrystallization of PPP from MCT Oil

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Many foods contain fats, and the physical properties of such products can greatly depend on the characteristics of the fat involved. The crystallization, and recrystallisation of fats, consequently may significantly affect product quality. The crystallization of pure triacylglycerols has been the object of several studies but recrystallization has been studied only a little. Here we have used a model system of tripalmitoylglycerol (PPP) in Medium Chain Triacylglycerol oil (MCT), monitoring recrystallization by proton NMR. The PPP was per-deuterated to allow it to be distinguished from the MCT oil.

A saturated solution at 28°C, with crystalline PPP present, was heated to 33°C in order to partially melt the crystalline PPP and allow dissolution into the MCT oil. The system was subsequently cooled back down to 28°C and the intensity of the proton signal from PPP in the liquid phase was monitored. Thus, recrystallization was induced from the supersaturated solution. The reduction in the signal from the deuterated PPP in the liquid phase indicated a two-step recrystallization process. Approximately two thirds of the crystallisable material was removed from the liquid phase within a few minutes. The remaining crystallisable material moved into the solid phase over a much longer timescale of many hours. We propose that an etched and pitted surface remained following dissolution. Initial crystallization would rapidly fill these pits, but further growth on the subsequently smoothed surfaces would be much slower.