Polymorphic Selection of Glycine in Water/Oleic Acid Emulsions by Cooling Crystallization

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A nucleation of α-glycine is commonly induced in crystallization of glycine from a bulk aqueous phase without additives such as pH control agents or surfactants. However, in present work, selective crystallization of γ-glycine was successfully demonstrated from water/oleic acid emulsions without any additives. It was found that carboxyl head groups of oleic acid at the water/oleic acid interface strongly influence a direct nucleation of γ-glycine by interaction with the $NH3^+$-rich (001) face of γ-glycine. The nucleation of γ-glycine was preferentially induced when the γ-form was used in solution with a relatively high oleic acid content and slow cooling rate. For instance, when an aqueous γ-glycine solution with a saturation temperature of 60 °C was used, γ-glycine were produced with 40 wt% of oleic acid content at moderate cooling rates of 10 to 45 °C/h. Furthermore, when the oleic acid content was 40 wt% in aqueous α-glycine solution/oleic acid emulsions, γ-glycine were obtained at cooling rates slower than 20 °C/h. However, α-glycine were obtained at cooling rate of 10 °C/h with the oleic acid content lower than 30 wt%.