Cocrystallization of Caffeine and Maleic Acid in Rotating Disk Crystallizer

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We studied the influence of a periodic torsional couette flow, which was generated in the rotating disk (RD) crystallizer, on the cocrystallization of caffeine and maleic acid including stoichiometric diverse nucleation and phase transformation. Also it was compared with the influence of a random turbulent flow in the mixing tank (MT) crystallizer. In the MT crystallizer, the nucleation of the metastable form (2:1) of cocrystals occurred first and then was slowly transformed to the stable form (1:1). However, it was significantly different that the stable form (1:1) of cocrystals was directly nucleated in the RD crystallizer, and demonstrated the significant influence of fluid motion on the stoichiometric diverse nucleation of cocrystals. That is, the torsional couette flow was highly efficient for nucleation of stable cocrystals and its efficiency was enhanced as increasing the rotation speed of RD crystallizer. Three different conditions were studied during the cocrystallization. It was demonstrated that the rotation/agitation speed and initial supersaturation influence the induction time and phase transformation time, and the cooling rate influences the purity of cocrystals.