**Crystallization in Complex Multicomponent Chiral Systems**

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**Highlights**

* Resolution Control in a Continuous Preferential Crystallization Process
* Continuous Antisolvent Deracemization
* Semi-continuous Deracemization via Racemic Crystal Transformation monitored by in-situ Raman Spectroscopy

The biological activity of a chiral compound often depends on its handedness. However, the physical properties of left- and right handed molecules are the same. The manufacture of just one of the two chiral forms, therefore, is a challenge. Crystallization is an extremely powerful technology to enable the manufacture of enantiopure crystalline products: Enantiopure crystals are highly selective towards incorporation of enantiomer solutes with the same handedness. Therefore, chiral separation of the enantiomers through crystallization can lead to high enantiopurities, for instance through preferential crystallization. The extension of the crystallization process with a racemization reaction in the solution (deracemization) has additional benefits for yield as well as process stability: the counter enantiomer is racemized towards the preferred one (higher yield) so that the supersaturation for the counter enantiomer remains low (no crystal nucleation of the counter enantiomer crystals). In addition, for continuous manufacturing of enantiopure compounds these crystallization processes can be beneficial due to steady state operation and continuous control opportunities.

I will discuss a number of process configurations in which controlled crystallization is used to obtain an enantiopure product from complex multicomponent racemic systems.

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