**Model-based analysis of continuous crystallization-milling processes with respect to productivity, particle size and polymorphic purity**

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**Highlights**

* Continuous crystallization processes of varying complexity are analyzed using population balance equation models.
* Attainable regions of particle sizes are identified for various continuous crystallization processes.
* For polymorphic systems, regions where phase pure material can be generated are identified and rationalized in terms of the required operating conditions.

Manufacturing pure material at a reasonable productivity and with good robustness is the goal of any industrial crystallization process. In this contribution, a few case studies will be presented where continuous crystallization processes have been analyzed using population balance equation models. The case studies will include works that elucidate the envelope of feasible product particle sizes from a given continuous crystallization process[1,2], as well as works where innovative milling/crystallization processes coupled with ancillary unit operations have been used to generate polymorphically[3,4] pure products. Across both sets of works, feasible operating conditions were identified and the process performance (with respect to yield, mean particle size, and phase purity) within this feasible region was investigated. While using the devised models quantitatively for this purpose relies on suitable kinetic parameters, it will be shown that even the qualitative (and quite general!) trends obtained from the models are of great use from a process design perspective.

**References**

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