

Crystallization Engineering using Antisolvent Nozzle Design

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Crystallization using the addition of antisolvent into solution is the typical unit operation producing powders in many industries including pharmaceutical industry. One of the main aim of the operation is obtaining powders with good flow properties, and the relatively large particle size and low aspect ratio could guarantee the flow properties of crystal particles. Various processing parameters have been intensively examined to meet the criteria of post processing steps. Herein, a wide range of nozzle size and tip design have been employed to understand the effect of nozzle on the size and morphology of crystals. A specially designed nozzle tip structure could produce significantly reduced aspect ratio or increased particle size in the crystallization of drugs with acicular crystal habit. Furthermore, these nozzles did not show significant dependence on the flow rate of antisolvent. These results indicate that the uniformity of antisolvent-solvent mixing could guide the nucleation and growth processes of crystals, and this novel understanding could bring a new strategy of crystal engineering in practical engineering fields.