

Dynamic simulation and model predictive control of gas anti-solvent recrystallization process

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Crystallization processes are widely used in various applications such as polymers, dyes, pharmaceuticals, and explosives. Novel crystallization processes using supercritical fluids have recently attracted much attention due to the environmental advantage of using environmentally benign carbon dioxide as a solvent. Gas anti-solvent (GAS) process is one of the most common supercritical processes, which utilize the low solubility of the anti-solvent to produce particles. In general, control of the crystallization process using supercritical fluids is challenging problem because the process is complicated and highly nonlinear. In this work, a mathematical model from a population balance model (PBM) is developed to describe a particle size distribution (PSD) of GAS process and it is numerically solved. We present a model predictive control (MPC) strategy to control PSD of GAS process. Linearization is required to apply MPC since GAS process is highly nonlinear.