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**Large-scale synthesis of functional nanoparticles using a coaxial turbulent jet mixer****Jong-Min Lim**

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Nanoparticles are widely studied for the diagnosis and therapy of various diseases. Microfluidic platforms are adopted for the synthesis of various nanoparticles due to controllability and reproducibility in their physicochemical properties. However, there are several intrinsic limitations in conventional Polydimethylsiloxane (PDMS) microfluidic systems for the synthesis of nanoparticles. In this work, we report a coaxial turbulent jet mixer capable of synthesizing various types of functional nanoparticles with high-throughput manner, while maintaining the controllability and reproducibility of PDMS microfluidic systems. In the coaxial turbulent jet mixer, the inner flow stream containing raw materials mixed with outer stream of non-solvent by turbulent flow for self-assembly of nanoparticles by rapid solvent exchange method called nanoprecipitation. Two dimensionless parameters, flow velocity ratio and Reynolds number (Re), were used to classify the mixing behavior into flow regimes. Operating in the turbulence jet regime, the mixing time could be precisely controlled by changing the Re. Nanoparticles obtained using the coaxial turbulent jet mixer at high Re (i.e., rapid mixing) were more homogeneous and smaller than those synthesized by bulk mixing, because the mixing time scale is more controllable and shorter than the characteristic aggregation time scale. Since the coaxial turbulent jet mixer is compatible with various organic solvents, it is versatile system where various types of nanoparticles. Various functional agents could be loaded in the nanoparticles during the nanoprecipitation. The coaxial turbulent jet mixer can be used to make functional nanoparticles with high-throughput and reproducible manner suitable for clinical studies and mass production.

**Biography**

Jong-Min Lim has completed his PhD degree in Chemical and Biomolecular Engineering from KAIST. After Post-doctoral studies from KAIST, Harvard Medical School and MIT, he has worked in Samsung Electronics as a Principal Engineer. Currently, he is an Assistant Professor in Department of Chemical Engineering, Soonchunhyang University. He has published more than 25 papers.

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