Continuous synthesis of cesium lead halide perovskite quantum dots in a micro reactor

이채영, 김현빈, 김도현†
KAIST
(dohyun.kim@kaist.edu†)

Perovskite quantum dots have attracted attention as a next-generation optoelectronic material because of flexible band gap tunability, high luminous efficiency and a narrow emission wavelength width. Since perovskite reacted rapidly at high temperature, controlling reaction time is strongly needed. However, the solution phase synthesis in a batch reactor has a drawback of non-uniform heat and mass transfer. However, microfluidic reactor has advantage of fast and uniform heat and mass transfer due to small scale of system and can be used in a continuous mode. We have designed the microfluidic reactor composed of bolt and nut-type components to synthesize cesium lead halide perovskite. The reactor was made of stainless steel and can be easily cleaned and reused. It is possible to scale up by stacking reactors. Cesium lead halide were synthesized in the channels formed in the gaps between the bolt and nut. To fabricate perovskite, cesium oleate and lead halide solution were mixed in the channel and heated to 160 ℃. The PL spectra and morphology of perovskite were characterized using PL and TEM. The PL peak of the $CsPbBr_3$ was located at 510nm and had a uniform cubic crystal structure.