

Reconfigurable microfluidic reactor to manipulate the size of silver nanoparticles by simply changing the injection flow rate of reagents

박범준, 곽철환, 강성민, 허윤석[†]
인하대학교
(yunsuk.huh@inha.ac.kr[†])

In this study, a customized droplet-based microfluidic reactor was fabricated for the synthesis of silver nanoparticles (Ag NPs) using silver nitrate (AgNO_3) and branched polyethyleneimine (BPEI) as a precursor and a reducing agent, respectively. The effects of static mixing, temperature, and the volumetric flow rates of AgNO_3 and BPEI on the particle size were demonstrated. The use of a static mixer and the optimization of the reaction temperature enhanced the monodispersity of the Ag NPs. In addition, the size of the Ag NPs was manipulated by changing the flow rate ratio of AgNO_3 to BPEI at 60 °C for 60 min. Therefore, the microfluidic reactor proposed in this study is suitable for material synthesis applications requiring temperature control and mixing with a range of concentrations of chemicals. We believe that the customized microfluidic reactor will be a promising platform for the synthesis of several noble metal nanoparticles providing easy control of the device, low cost, and high chemical resistance.