Microfluidic-assisted production of photocurable Polycaprolactone microparticles for sustained drug delivery

Nguyen Phuong, 정헌호†
전남대학교
(jeonghh29@chonnam.ac.kr†)

Polycaprolactone (PCL)-based hydrogels have been recently considered as promising delivery vehicles of proteins, peptides and some small molecule drugs owing to their biodegradability, biocompatibility, adjustable degradation rate and cost efficiency. This work demonstrated a simple method to synthesize monodisperse photocurable Polycaprolactone diacrylate (PCLDA) microparticles by using PDMS microfluidic device. A flow-focusing microfluidic chip was used to produce oil-in-water droplets followed by photopolymerization for the production of microparticles. Highly uniform-size microparticles would be obtained by controlling the flow conditions of the two immiscible solutions inside the microchannels. Additionally, the change in size over time and the difference in morphology between PCLDA microparticles generated by solvent evaporation and UV irradiation method were shown to demonstrate the superiority of UV-light polymerization in the manufacture of high-quality microparticles. This new strategy described herein provides a new type of smart drug carrier for controllable drug delivery.