

Fabrication of Deformable Hydrogel Microparticles for Cell Delivery

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We report an intuitive concept of microcarriers which can capture/release cells by swelling of foldable hydrogel microparticles. Since hydrogel microparticle consist of solid support layer and responsive hydrogel layer, particle swells anisotropically which enables folding of particle. To achieve this, we fabricated double-layered microfluidic devices by using conventional photolithography and a soft-lithographic procedure. Then, ethoxylated trimethylolpropane triacrylate (ETPTA) and poly(ethylene glycol) diacrylate (PEGDA) precursor mixed with 5 % (v/v) a photoinitiator were used for photopolymerizable fluids and were injected to upper and lower channels, respectively. When the two fluids formed vertical laminar flow, flows were stopped and UV light was illuminated through photomask to downstream of microchannels for photopolymerization. As a result, bi-layer microparticles were fabricated and collected at the outlet. After repeated washing, microparticles were immersed in water with various pHs in order to observe deformation of microparticles. Finally, we demonstrated capture/release of colloidal microspheres by using our microparticles.