

Droplet-based microfluidic synthesis of monodisperse PEGDA microparticles with encapsulated magnetic nanoparticles and fluorescent silica nanoparticles

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Polymerized poly(ethylene glycol) diacrylate(PEGDA) was used as container of Fe_3O_4 nanoparticles and fluorescent silica particles. A droplet-based microfluidic method for the preparation of monodisperse PEGDA microdroplets was developed. Prepared PEGDA microdroplets have uniform size and fine round shape, with a size around 25–130 μm using flow-focusing device with a orifice of 50 μm . The size of microdroplets can be controlled through the changing orifice size and continuous phase flow rate. Successful fabrication of PEGDA microparticles entrapping Fe_3O_4 nanoparticles and fluorescent silica particles were confirmed by attraction to external magnetic field and exhibition of the fluorescence, respectively. Due to the biocompatibility of PEGDA and the magnetism of Fe_3O_4 , this microparticle could be applied to biological fields such as a smart drug delivery, bio-separation, bio-imaging and enzyme immobilization.