

Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Fabrication of water-in-water colloidosomes from aqueous two-phase systems using droplet microfluidics WEI GUO, YAGE ZHANG, SHIPEI ZHU, ANDERSON H. C. SHUM, Department of Mechanical Engineering, The University of Hong Kong, Pokfulam Road, Hong Kong — We describe the fabrication of stable and monodispersed colloidosomes derived from water-in-water microdroplets using an integrated high-throughput microfluidic system. Liquid-liquid phase separation of aqueous two-phase systems (ATPS) inside the microdroplets is used as the driving force to form the semipermeable shell of colloidosomes. Droplets of water-in-oil are firstly generated in a microfluidic flow-focusing device, where aqueous dextran solutions with the addition of negative-charged nanoparticles are used as dispersed phase. Then we use a pico-injector to introduce another component, aqueous polyethylene glycol (PEG) solutions with the addition of positive-charged polyelectrolytes, into the microdroplets. Phase separation inside the pico-injected droplets happens due to the non-equilibrium osmotic pressure between the two components, triggering the formation of crosslinked shells by complex coacervation. Our confocal images and stiffness test show that these shells have stable morphology and robust structures. Finally, we use a microfluidic sorting module to transfer those droplets containing crosslinked shells from oil phase to aqueous PEG phase, allowing the fabrication of water-in-water colloidosomes in a high-throughput way.

Wei Guo
The University of Hong Kong, Pokfulam Road, Hong Kong

Date submitted: 01 Aug 2019

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