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Engineered Asymmetric Synthetic Vesicles LI LU, PAUL CHIAROT, State University of New York at Binghamton — Synthetic vesicles are small, fluid-filled spheres that are enclosed by a bilayer of lipid molecules. They can be used as models for investigating membrane biology and as delivery vehicles for pharmaceuticals. In practice, it is difficult to simultaneously control membrane asymmetry, unilamellarity, vesicle size, vesicle-to-vesicle uniformity, and luminal content. Membrane asymmetry, where each leaflet of the bilayer is composed of different lipids, is of particular importance as it is a feature of most natural membranes. In this study, we leverage microfluidic technology to build asymmetric vesicles at high-throughput. We use the precise flow control offered by microfluidic devices to make highly uniform emulsions, with controlled internal content, that serve as templates to build the synthetic vesicles. Flow focusing, dielectrophoretic steering, and interfacial lipid self-assembly are critical procedures performed on-chip to produce the vesicles. Fluorescent and confocal microscopy are used to evaluate the vesicle characteristics.

Li Lu
State University of New York at Binghamton

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