Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Biofilm Formation in Microscopic Double Emulsion Droplets CONNIE CHANG, DAVID WEITZ, Harvard University — In natural, medical, and industrial settings, there exist surface-associated communities of bacteria known as biofilms. These highly structured films are composed of bacterial cells embedded within self-produced extracellular matrix, usually composed of exopolysaccharides, proteins, and nucleic acids; this matrix serves to protect the bacterial community from antibiotics and environmental stressors. Here, we form biofilms encapsulated within monodisperse, microscopically-sized double emulsion droplets using microfluidics. The bacteria self-organize at the inner liquid-liquid droplet interfaces, multiply, and differentiate into extracellular matrix-producing cells, forming manifold three-dimensional shell-within-a-shell structures of biofilms, templated upon the inner core of spherical liquid droplets. By using microfluidics to encapsulate bacterial cells, we have the ability to view individual cells multiplying in microscopically-sized droplets, which allows for high-throughput analysis in studying the genetic program leading to biofilm development, or cell signaling that induces differentiation.

Connie Chang
Harvard University

Date submitted: 28 Nov 2011 Electronic form version 1.4