Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Simple and inexpensive micro-capillary devices for generating composite emulsions ERQIANG LI, JIAMING ZHANG, SIGURDUR THORODDSEN, King Abdullah University of Science and Technology, Saudi Arabia — All-glass microfluidic devices have attracted recent attention due to their excellent chemical robustness, bio-compatibility, optical properties and the ease of modifying their surface wettability. Herein we report the usage of a single tapered cylindrical glass capillary and microscope slides to fabricate simple and inexpensive all-glass microfluidic devices that are capable of producing monodisperse double emulsions. Triple emulsion droplets of water-in-oil-in-water-in-oil (W/O/W/O) or O/W/O/W phases can also be stably generated by adding another cylindrical capillary next to the outlet of the first capillary. In addition, by careful controlling the wettability of the inner surface of the first capillary, multi-component emulsion droplets of (gas and water)-in-oil-in-water ((G+W)/O/W) phases can also be stably produced. Such gas-laden emulsion drops may be beneficial for bio-related applications where oxygen supply is required. The relationship between the flow parameters and the resulting number of encapsulated droplets and the emulsion droplet sizes, have been investigated, for all of these various higher order emulsions.

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Date submitted: 02 Aug 2012 Electronic form version 1.4