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Double Emulsion Templated Celloidosomes[1] LAURA R. ARRIAGA, Department of Physics and Division of Engineering and Applied Science, Harvard University, Cambridge, MA 02138, SAMANTHA M. MARQUEZ, Maggie L. Walker Governor's School, 1000N. Lombardy St. Richmond, VA 23220, SHIN-HYUN KIM, CONNIE CHANG, JIM WILKING, Department of Physics and Division of Engineering and Applied Science, Harvard University, Cambridge, MA 02138, FRANCISCO MONROY, Department of Physical Chemistry, Complutense University, 28040 Madrid, Spain, MANUEL MARQUEZ, YNano LLC 14148 Riverdowns S. Dr. Midlothian, VA 23113, DAVID A. WEITZ, Department of Physics and Division of Engineering and Applied Science, Harvard University, Cambridge, MA 02138
— We present a novel approach for fabricating celloidosomes®, which represent a hollow and spherical three-dimensional self-assembly of living cells encapsulating an aqueous core. Glass- capillary microfluidics is used to generate monodisperse water-in-oil-in-water double emulsion templates using lipids as stabilizers. Such templates allow for obtaining single but also double concentric celloidosomes. In addition, after a solvent removal step the double emulsion templates turn into monodisperse lipid vesicles, whose membrane spontaneously phase separates when choosing the adequate lipid composition, providing the adequate scaffold for fabricating Janus-celloidosomes. These structures may find applications in the development of bioreactors in which the synergistic effects of two different types of cells selectively adsorbed on one of the vesicle hemispheres may be exploited.

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