

Abstract Submitted
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A CMOS / Microfluidic Vesicle Based Lab-on-a-Chip Platform

DAVID ISSADORE, THOMAS FRANKE, KEITH BROWN, Harvard University, School of Engineering and Applied Sciences, ROBERT WESTERVELT, Harvard University, School of Engineering and Applied Sciences and Physics — Droplet based microfluidic systems have proved to be useful tools for performing lab-on-a-chip experiments. Our lab has designed CMOS / microfluidic chips to trap, move, merge, and separate droplets of water in oil using dielectrophoresis (DEP) [1]. Vesicles provide a robust container for cells, bacteria, viruses, fluorescent markers, and can withstand a wide range of chemistries, salinity, and pH. We present a platform for programmable chemical and biological experiments that traps, moves, and merges vesicles suspended in water using DEP on our hybrid chip. Vesicles are loaded with 1-4mM NaCl and rhodamine and are suspended in a 200mM glucose solution. We trap and move individual vesicles along programmable paths at speeds up to 70 micrometers/sec. Two vesicles may be brought together and merged into one when triggered with electric fields that are created by the chip. [1] TP Hunt, D Issadore, RM Westervelt - Lab on a Chip, 2008.

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