

Experiments in Fluid Mechanics 2015

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Institute of Aeronautics and Applied Mechanics

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Title of presentation: Passive generation of serial dilutions on a chip for screening of membrane proteins activity
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Abstract: We present a system for passive generation of serial dilutions on a microfluidic chip. The method uses hydrodynamic traps and enables generation of concentration gradients within an array of microdroplets that can be used in DIB (Droplet Interface Bilayer) systems. Microfluidic DIB systems enable automation on membrane proteins [1]. We are developing a system that combines active manipulation of droplets with passive trapping for in situ electrical measurements on membrane proteins incorporated in a bilayer. Passive trapping is essential for the ability to simultaneously measure small ionic currents across the interface between droplets. We created an automated module for this platform that can generate serial dilutions in a completely passive manner, also compatible with the electrophysiological measurements on the chip. The system uses flow from external syringe pumps to perform operations on droplets traversing specially designed hydrodynamic traps. 1. M. A. Czekalska, T. S. Kaminski, S. Jakiela, K. T. Sapra, H. Bayley and P. Garstecki, Lab on a Chip, 2015, 15, 541-548.