Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Lego-fluidics: Building blocks for spatio-temporal microenvironment controller BOWEN LING, ILENIA BATTIATO, Stanford University — Achieving a desired solute concentration distribution in micro-environments is vital to many applications, e.g. cell stimulation, single-molecule monitoring, micro-scale mixing and solid-free gel-casting. Controlled spatio-temporal solute distribution may be needed, e.g., to enhance mixing and reactions or to enforce a prescribed temporally varying signal during cell growth. This is currently achieved by active and passive methods. Active microfluidic mechanisms create varying concentration fields by changing the flow, while passive mechanisms are based on micropatterns which generate specific concentration signals due to their unique topology. Here, we propose a new design to generate target spatiotemporal solute distributions while minimizing perturbation to the flow field. The design, based on a valve system, provides greater versatility and flexibility than previous designs. We modulized all the controllers and provide examples of connection patterns in serial and parallel.

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Date submitted: 29 Jul 2019 Electronic form version 1.4