Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Single-stream inertial focusing of microparticles across laminar streamlines through geometry-induced secondary flows ARAM CHUNG, DIANNE PULIDO, JUSTIN OKA, MAHDOKHT MASAELI, HAMED AMINI, DINO DI CARLO, Department of Bioengineering, UCLA — The ability to continuously control microparticle position in a confined microchannel is remarkably useful for a wide range of biomedical studies Current state-of-the-art systems to achieve particle focusing require either complex external setups accompanying complicated fabrication steps or logistically burdensome sheath fluid. Using the fluid inertia acting on particles in microchannels has been introduced to address these limitations since inertia can position particles precisely in a predictable manner. Previous work has predominantly demonstrated multiple focusing streams however here we present a novel method that initially randomly distributed microparticles can be focused into a single-stream by (1) introducing a series of cylindrical pillars in a microchannel or (2) locally modifying channel geometry Briefly, the combination of inertial focusing upstream and a pair of local helical secondary flows induced by the obstacles or steps in channel height allows for migration of microparticles to a single position in a high-throughput manner We present comprehensive numerical and experimental studies and results of the particle-fluid interaction and focusing mechanism, characterize the role of flow deformation, determine focusing accuracy and discuss potential applications.

Aram Chung
Department of Bioengineering, UCLA

Date submitted: 31 Jul 2012 Electronic form version 1.4