Supplementary Information (SI) for Lab on a Chip.

Supplementary Material to:

Real-time impedance-activated dielectrophoretic actuation for reconfigurable manipulation of single flowing particles

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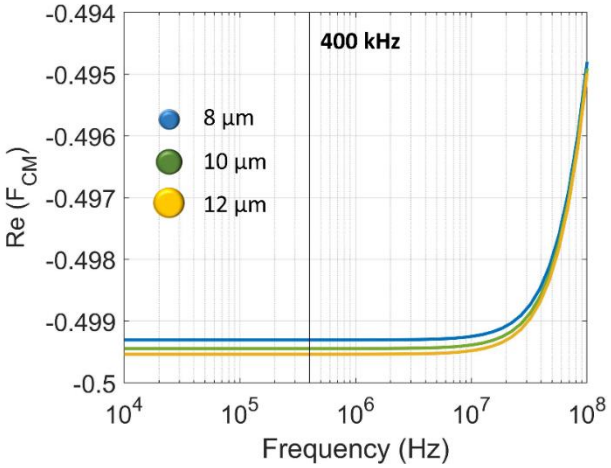

Figure S1. Real part of the Clausius-Mossotti factor of the 8, 10, and 12 µm diameter polystyrene beads. Medium properties: conductivity $\sigma_m = 0.9$ S/m, relative permittivity $\varepsilon_m = 80$. Bead properties[1,2]: surface conductivity $\kappa_s = 1.67$ nS (which amounts to a bead conductivity $\sigma_p = 4\kappa_s/d = 6.7 \times 10^{-4}$ S/m for the beads with diameter $d = 10$ µm), bead relative permittivity $\varepsilon_p = 2.5$.

	Zhong et al.[3]	De Wagenaar et al.[4]	Thomas et al.[5]	Lipp et al.[6]	Present work
Sensing approach	MIC	MIC	optical imaging	visual inspection	MIC
Actuation approach	focused travelling surface acoustic wave	DEP	DEP	DEP	DEP
Real-time processing and control approach	C-program running on a processor embedded in the impedance spectroscope	LabView program using USB connection between computer and impedance spectroscope	MATLAB program	manual	C-program running on a processor embedded in the impedance spectroscope
Particle pre-focusing mechanism	sheath flow focusing	DEP	DEP	none	none
Throughput	hundreds of particle/s	< 5 particle/s	up to 0.9 particle/s	~0.1 particle/s	~1 particle/s
Type of manipulation	two-way sorting (target particles are deviated)	two-way sorting (target particles are deviated)	two-way sorting (target particles are deviated) + demonstration of stream control through up to 5 channels	multi-way trajectory control (demonstrated 5-way)	multi-way trajectory control (demonstrated 3-way)
Reported application	enrichment of viable cells (cryopreserved primary PBMC samples)	sorting of beads from sperm cells	sorting of fluorescent particles/cells	formation of aggregates of controlled size and composition	particle position-swapping, size-based separation, sorting of a desired particle sequence

Table S1: Representative systems for selective manipulation of individual flowing particles/cells based on MIC-sensing and/or DEP-actuation.

References

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