Electronic Supplementary Material (ESI) for Lab on a Chip.

Supplementary Information

Microfluidic Co-flow of Newtonian and Viscoelastic Fluids for High-resolution Separation of Microparticles

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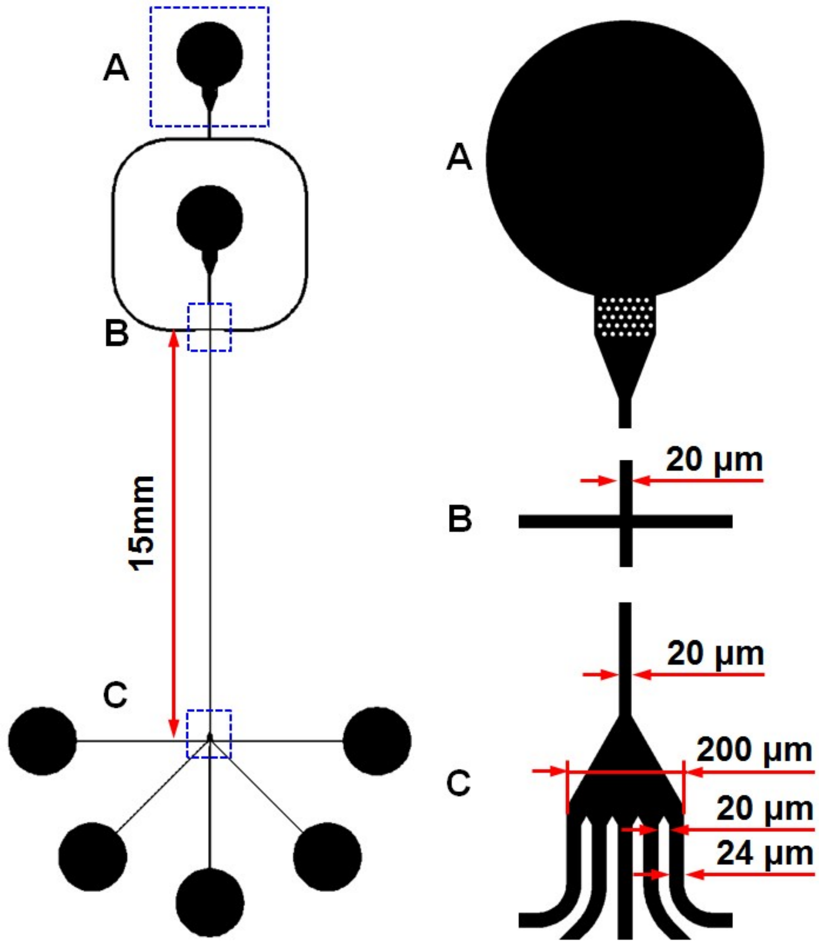

Figure S1. The microchannel design. The microfluidic device consists of two identical inlets with debris filters for sheath and sample flows, a separation channel (15 mm long and 20 µm wide), and five outlets for small particles (two side outlets) and large particles (three center outlets). The width of all the outlets is 24 µm. The entire microchannel has a uniform height of 50 µm.

Table-S1 Dimensionless numbers in experimental conditions

Total flow rate (μL/h)	PEO concentration							
	50 ppm (El = 0.40)		100 ppm (El = 0.64)		300 ppm (El = 1.41)		1200 ppm (El = 5.01)	
	Re	Wi	Re	Wi	Re	Wi	Re	Wi
1500	16.1	6.4	15.1	9.6	14.0	19.7	9.7	48.6
2100	22.5	9.0	21.2	13.5	19.6	27.6	13.6	68.1
2700	28.9	11.6	27.2	17.4	25.2	35.6	17.5	87.6
3300	35.3	14.2	33.2	21.3	30.8	43.4	21.4	107.2

Table-S2 Comparison of experimental conditions for viscoelastic particle manipulation.

Channel width×height (μm^2)	Particle diameter (μm)	Re	Wi	El	Manipulation
5×5[S1]	0.1 – 0.5	0.11 – 0.33	178 – 533	1618.18	Focusing
30×10[S1]	1.38 – 3	1.7×10^{-3} – 1.36×10^{-2}	0.21 – 1.68	123.53	Focusing
50×50[S2]	5.8	0.018 – 7.1	4 – 1580	224	Focusing
50/100/150×50[S3]	2 – 10	0.001 – 10.16	0.07 – 97.7	5.18 – 58.8	Focusing
25/50/100×25[S4]	6.42	0.35 – 30.07	1.67 – 57.72	0.66 – 13.36	Particle transfer
50×52[S2]	1 – 10.5	5.9	1321.6	224	Separation
100/200×50[S5]	5 – 15	0.28 – 13.89	6.1 – 244.4	8.79 – 35.18	Separation
40×10[S5]	1 – 3	0.07 – 0.69	15.3 – 152.8	221.45	Separation
50×50[S6]	6	1.2×10^{-3} – 9.6×10^{-3}	0.082 – 0.656	68.33	Separation
50×50[S7]	1 – 5	0.5 – 4	12.8 – 103	25.7	Separation
30×54[S8]	2 – 9.9	0.28 – 28	1.37×10^{2} – 1.37×10^{4}	489.74	Separation
20×50 (Present)	**1 – 2**	**15.1 – 33.2**	**9.6 – 87.6**	**0.4 – 5.01**	**Separation**

Additional supplementary materials

Supplementary **Video 1**: The separation performance of 1 μm and 2 μm particles under three sheath/sample flow conditions.

Supplementary **Video 2**: The separation performance of SA and platelet.

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