

Supplementary Material (ESI) for Lab on a Chip

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Supplementary Electronic Information

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**Electrokinetic Concentration Enrichment within a Microfluidic
Device Using a Hydrogel Microplug**

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(6 pages)

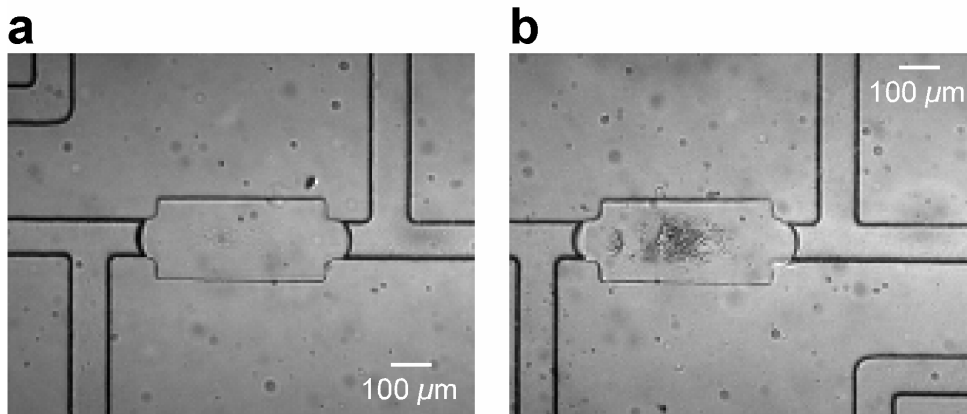


Fig. S1. Optical micrographs of the photopolymerized (a) neutral and (b) anionic hydrogel microplugs used for the DNA concentration experiments after conditioning by applying a bias voltage (100-300 V) between ResA and ResB (Fig. 1). The channels shown at the upper-left corner of (a) and at the lower-right corner of (b) are the reference channels.

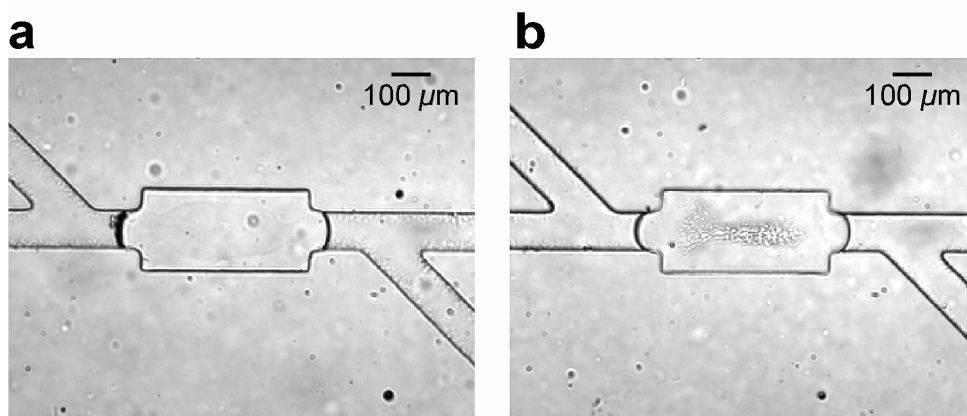


Fig. S2. Optical micrographs of the microfabricated (a) neutral and (b) anionic hydrogel plugs used for fluorescein concentration experiments after conditioning the hydrogel by applying a bias voltage (100-300 V) between ResA and ResB (Figure 1).

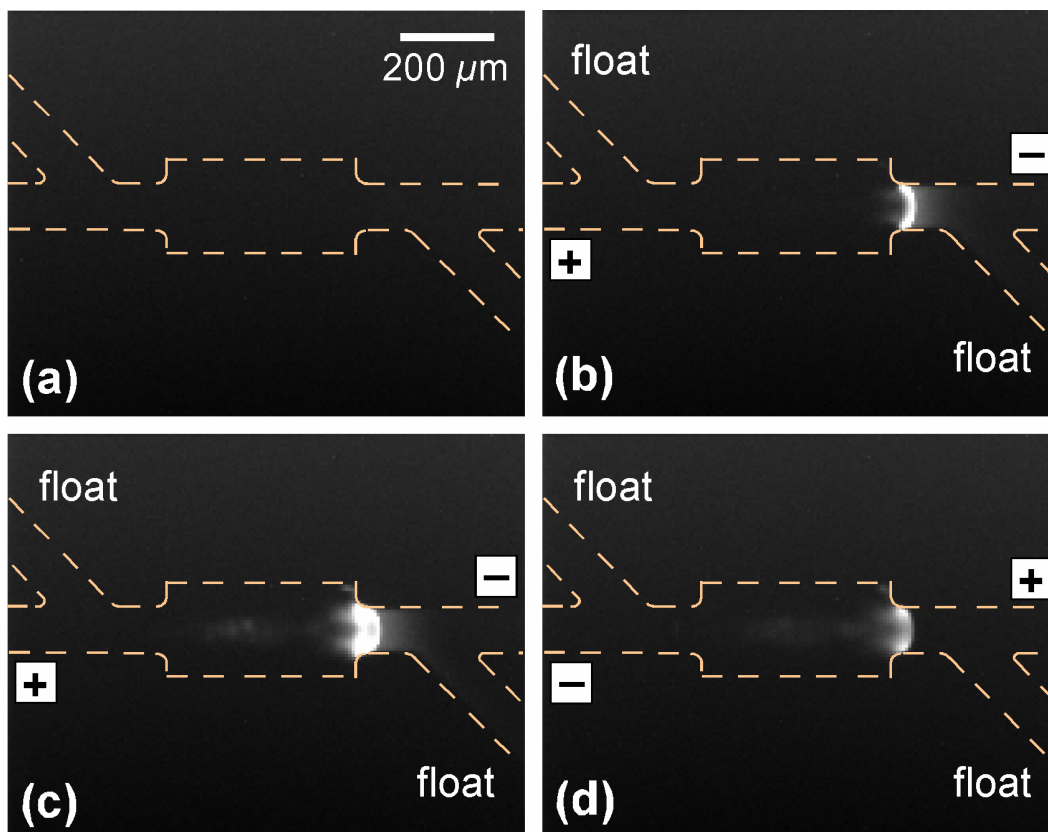


Fig. S3. Fluorescence micrographs obtained during concentration of fluorescein using the neutral hydrogel. (a) Before applying a potential bias. After applying a forward bias of 100 V for (b) 50 s and (c) 150 s. (d) 50 s after applying a reverse bias of 100 V (total elapsed time = 220 s). No bias voltage was applied to the side channels labeled "float". The image size was 163 pixels x 128 pixels, and the full-scale intensity range was 135 to 4095 counts per pixel. The complete movie is included in the Supplementary Information as Movie S2.

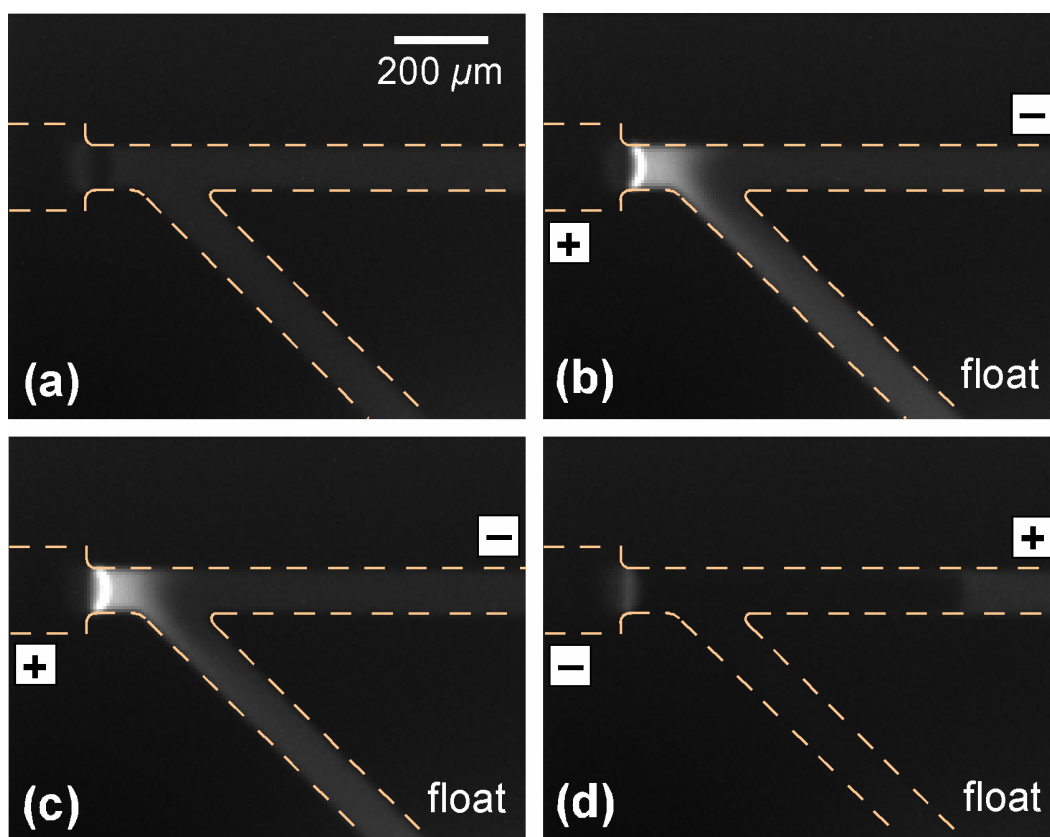


Fig. S4. Fluorescence micrographs obtained during concentration of fluorescein using the anionic hydrogel. (a) Before applying a potential bias. After applying a forward bias of 100 V for (b) 50 s and (c) 150 s. (d) 50 s after applying a reverse bias of 100 V (total elapsed time = 220 s). No bias voltage was applied to the side channels labeled "float". The image size was 163 pixels x 128 pixels, and the full-scale intensity range was 193 to 1978 counts per pixel. The complete movie is included in the Supplementary Information as Movie S4.

Movie S1. Time-resolved fluorescence micrographs demonstrating DNA concentration in a microfluidic channel incorporating a neutral hydrogel. Before applying the potential bias between ResA and ResB (Figure 1), the buffer solution on the right side of the hydrogel microplug (channel section ResB'-ResB) was replaced with 10.0 mM TRIS buffer containing 5 μ M ssDNA, and solution levels in all the reservoirs were equalized to reduce the possibility of pressure-driven flow. These same conditions were used in all experiments. Image frames were captured at a rate of 1 frame/s for a total of 360 frames. The image size was 163 pixels \times 128 pixel, and the full-scale intensity range was 160 to 4095 counts per pixel. The movie will play back at a rate of 6 frame/s so that the total run time is 60 s. This movie was used to obtain the data shown in Fig. 2 and 3 of the main text.

Movie S2. Time-resolved fluorescence micrographs demonstrating fluorescein concentration in a microfluidic channel incorporating a neutral hydrogel. The full-scale intensity range was 135 to 4095 counts per pixel, and the other conditions were the same as those for Movie S1. This movie was used to obtain the data shown in Fig. 4 of the main text.

Movie S3. Time-resolved fluorescence micrographs demonstrating ssDNA concentration in a microfluidic channel incorporating an anionic hydrogel. The full-scale intensity range was 154 to 4024 counts per pixel, and the other conditions were the same as those

for Movie S1. This movie was used to obtain the data shown in Fig. 5 and 6 of the main text.

Movie S4. Time-resolved fluorescence micrographs demonstrating fluorescein concentration in a microfluidic channel incorporating an anionic hydrogel. The full-scale intensity range was 193 to 1978 counts per pixel, and the other conditions were the same as those for Movie S1. This movie was used to obtain the data shown in Fig. 7 of the main text.

The timing for all movies is summarized in the following table.

Show Time (s)	Real Time (s)	Bias (V)
0.00	-10	0
1.67	0	100 (forward)
26.7	150	0
30.0	170	100 (reverse)
55.0	320	0
