Electronic Supplementary Material (ESI) for Nanoscale.

Supplementary information

Combining dielectrophoresis and concentration polarization-based preconcentration to enhance bead-based immunoassay sensitivity

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1. Figures

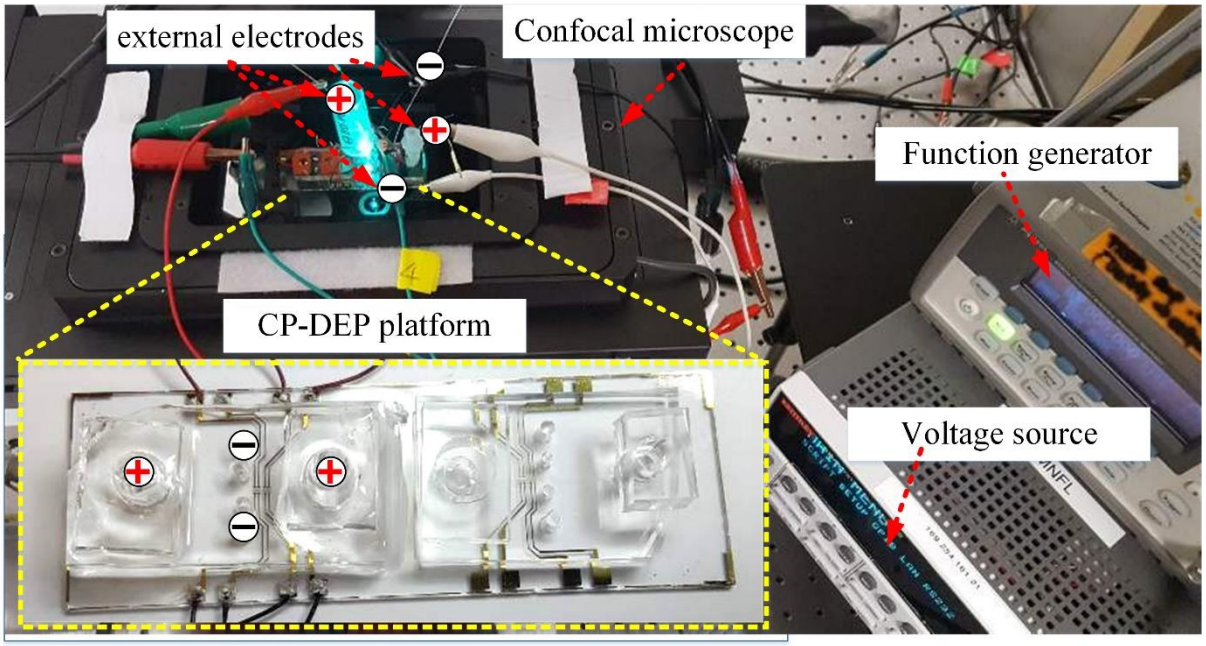

Fig. S1: A photographic image of the experimental setup with fabricated chip.

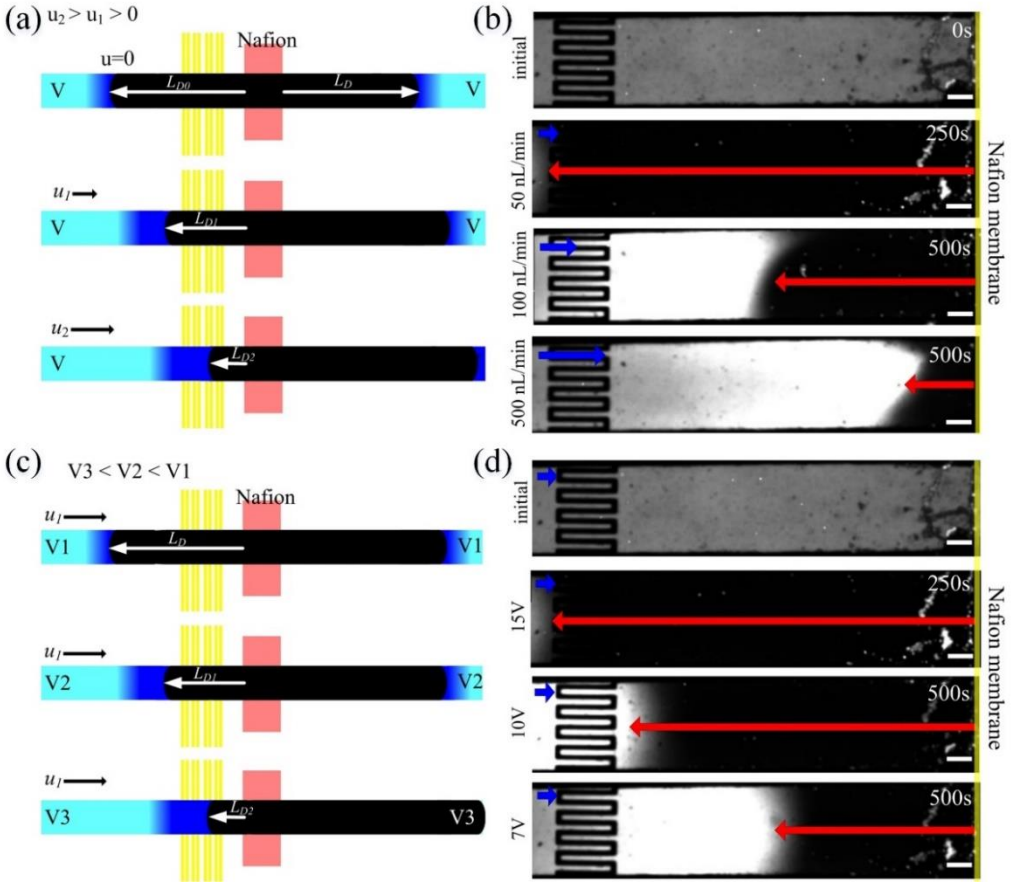

Fig. S2: The dependency of the location of the preconcentrated plug on the applied flow rate (a and b) and voltage (c and d). As seen, the preconcentrated plug forms closer to the membrane interface with increasing flow rate or decreasing voltage. Here, the embedded electrodes were not operated.

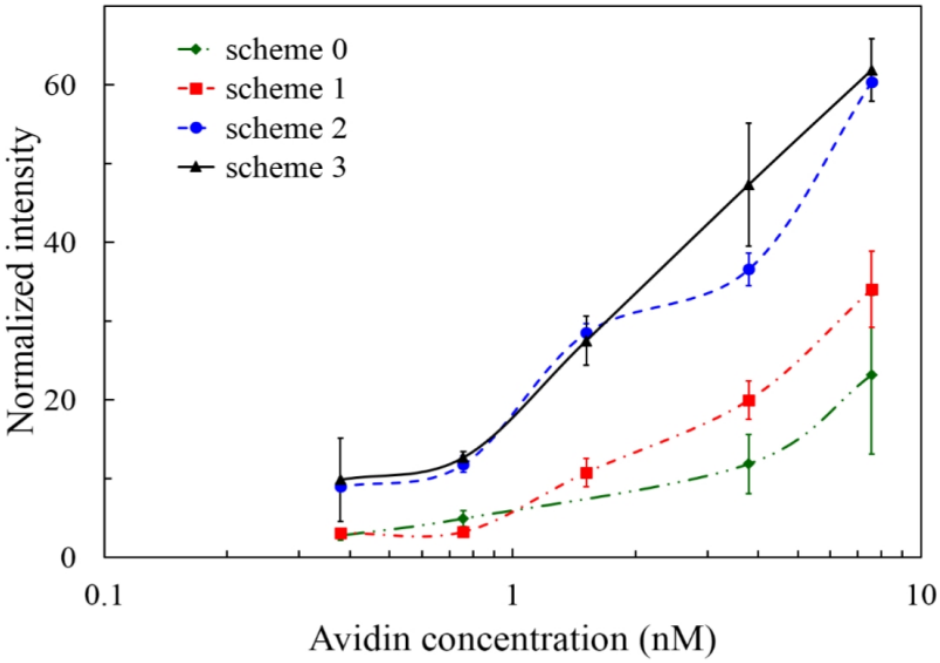

Fig S3: The peak measured fluorescence intensity as a function of avidin bulk concentrations for various immunoassay schemes within the DEP-CP platform. The limit of detection (LOD) in scheme 0 was significantly improved. The normalized intensity was obtained by normalizing the peak intensity in the interrogation window (~20 × 50 μm^2) at 10 s after release by the integral intensity of the interrogation window at time t = 0 s.

2. Movies

Movie 1: Time evolution of the preconcentration plug upstream of the microchannel-membrane interface, under a constant flow rate (200 μm/s).

Movie 2: DEP characterization of the biotin-conjugated polystyrene beads in 0.01X PBS using a quadrupolar electrode array. The applied AC electric fields were 5Vpp with 80kHz and 500kHz for pDEP and nDEP, respectively.

Movie 3: Immunoassay scheme 3 including several steps: (1) trapping of the biotin-conjugated particles using DEP; (2) binding of the simultaneously CP-preconcentrated avidins onto the

preconcentrated freely suspended (after release from the DEP trap) biotin-conjugated particles; (3) release of the trapped avidin-biotin particles.