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

Supporting Information

Ultrafast immunoassays by coupling dielectrophoretic biomarker enrichment on nanoslit molecular dam device with electrochemical detection

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Confirming biofunctional capture probes in nanoslit

The fluorescence images in Figure SI-1 confirm the biofunctionality of immobilized anti-PSA capture probes after nanoslit bonding (Fi. SI-1b) and their ability to bind with PSA (Fig. SI-1c).

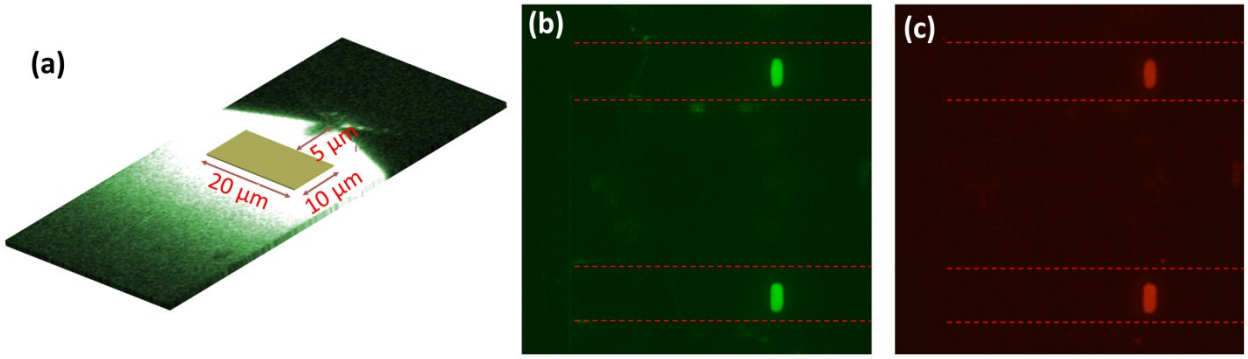

Figure SI-1: (a) Anti-PSA capture probes are immobilized on a patch of the glass cover slip that is aligned and bonded to be inside the quartz nanoslit and 5 µm away from the constriction tip in the molecular dam enrichment region. Fluorescence images confirm presence of anti-PSA (Dylight 488 label) in nanoslit after bonding (b) and binding to Dylight 594 labeled PSA (c).

Raw voltammetric scans for PSA analysis in serum samples

Figure SI-2 presents example voltammetric scans used for measuring the dilution plot of Figure 6 at steady state (≥ 120s binding time after nDEP enrichment, as described in the manuscript) for PSA analysis within spiked serum samples at the indicated net concentration levels.

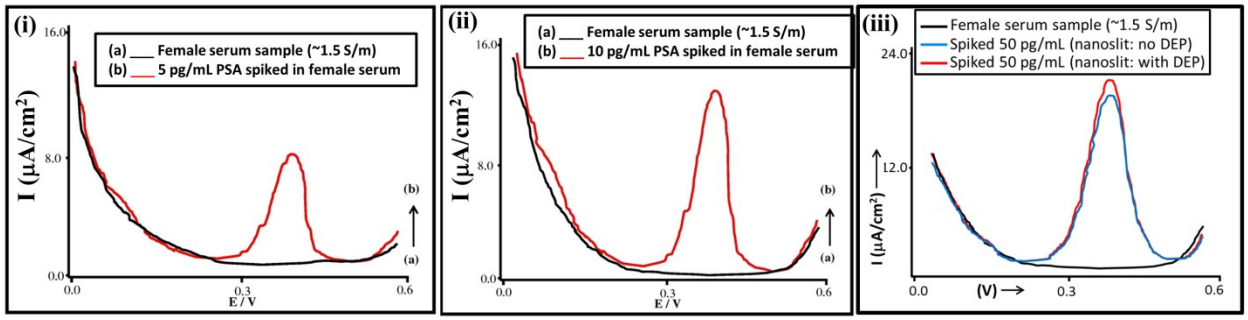

Figure SI-2: Voltammetry scans after spiking female serum samples with PSA in PBS so that the net PSA concentration is: (i) 5, (ii) 10, and (iii) 50 pg/mL, at a media conductivity of ~1.5 S/m, after nDEP enrichment in nanoslit molecular dam device at steady state signal levels.

Figure SI-3 presents example voltammetric scans used to analyze PSA within the de-identified patient samples. In (i), we present typical scans after ~10-fold dilution of the respective samples in PBS media to result in a media conductivity of ~1.5-1.6 S/m. This was used to quantify the PSA levels after correcting for the dilution, as presented in Table 1 of the manuscript. In (ii), we present a typical scan after ~5-fold dilution of Sample 3 in PBS media to result in a media conductivity of ~1.3 S/m. Here, the lower media conductivity causes a noisier background that rises with voltage, thereby leading to poorer sensitivity and less ability to quantify signals.

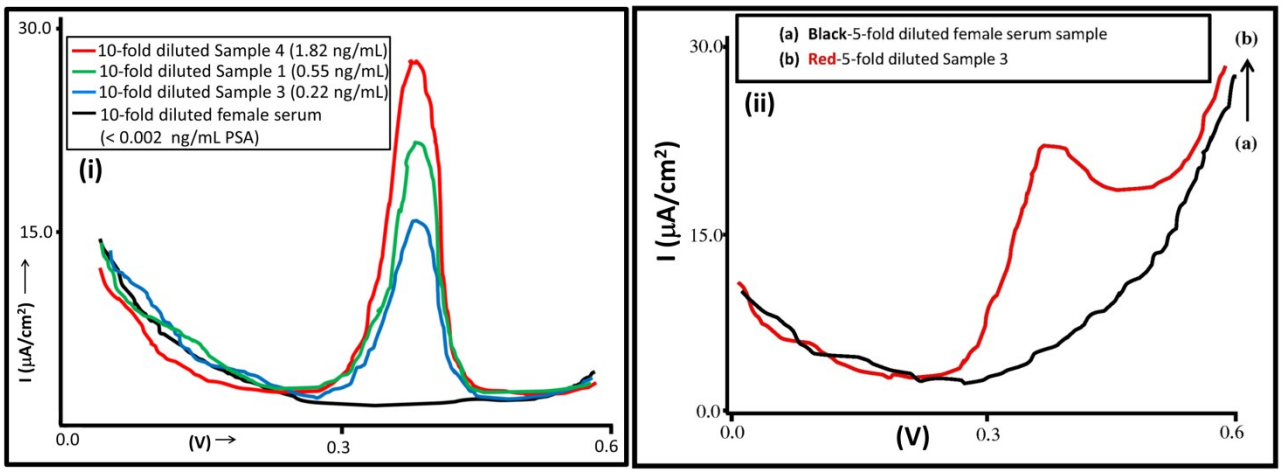

Figure SI-3: (i) Voltammetry scans for PSA analysis within Samples 1, 2 and 3 after ~10-fold dilution in PBS media to bring media conductivity to 1.5 S/m; (b) (right) Voltammetry scan for PSA analysis after ~5-fold dilution of Sample 3 in PBS media (media conductivity ~1.3 S/m).