Supporting Information

Integrated nanoplasmonic sensing for cellular functional immunoanalysis using human blood

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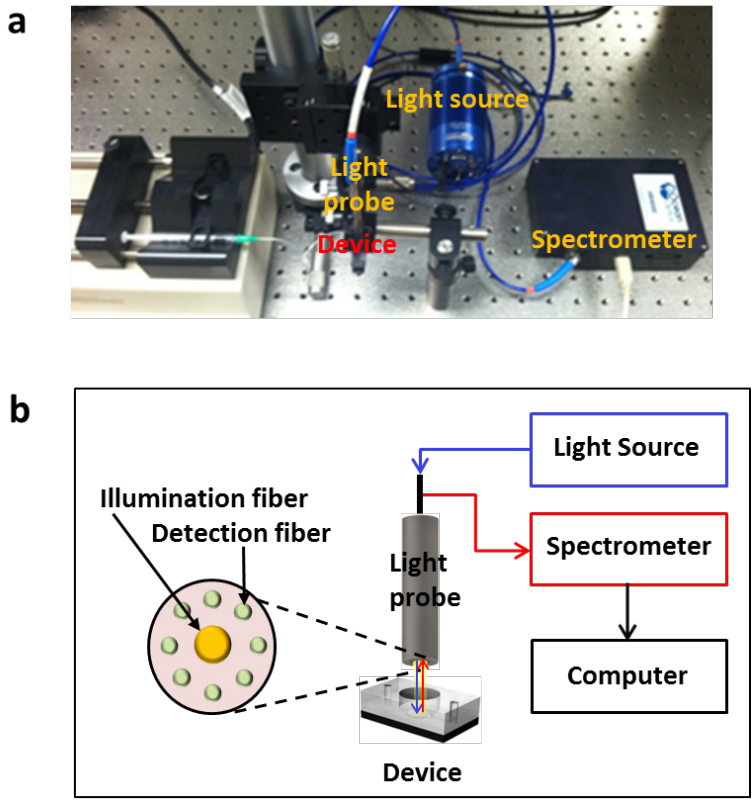

Figure S1. LSPR detection setup used for obtaining the absorbance spectrum of the LSPR detection surface of the optofluidic platform. The setup includes a light source, a light probe, a spectrometer, and a signal-processing computer. The light probe has a core illumination fiber connected to the light source and a bundle of embedded optical fibers. The light source provides a full spectrum of light that excites the gold nanostructured LSPR detection surface. The bundled optical fibers collect the light reflected from the detection surface. The collected reflected light signal transfers into the spectrometer and by pass through the grating, mirror and CCD detector, the light spectrum is converted into electrical signal for analyzing.

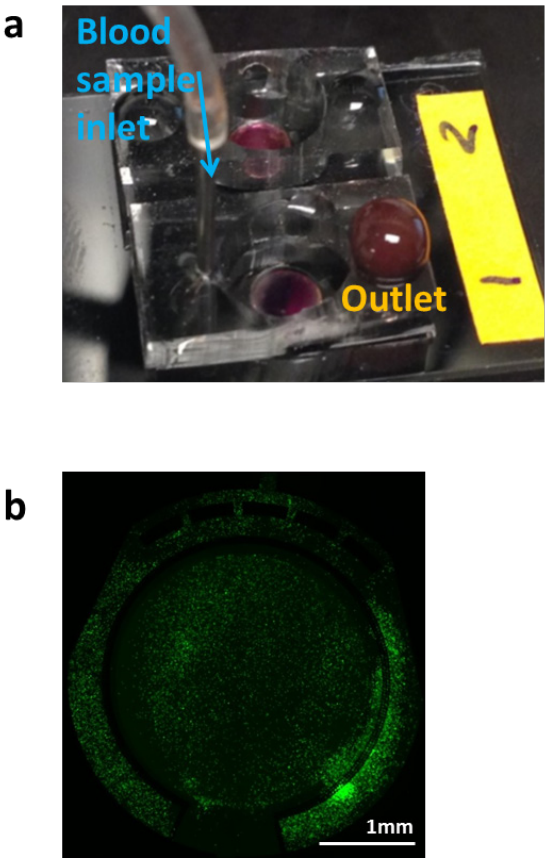

Figure S2. (a) Photo image of the real LSPR optofluidic device with lysed blood loaded from the inlet. Unfiltered blood cells and other blood contents are ejected from the outlet. The cells trapped in the device were bounded to the microbeads, and stimulated and incubated for on-chip immunofunctional assay. (b) Fluorescence image of freestanding calceinAM-stained cells loaded to the device without microbead conjugation. Approximately, the half of the loaded cells were squeezed out, escaped through the micro-pillar arrays, and moved out to the detection surface region of the device.

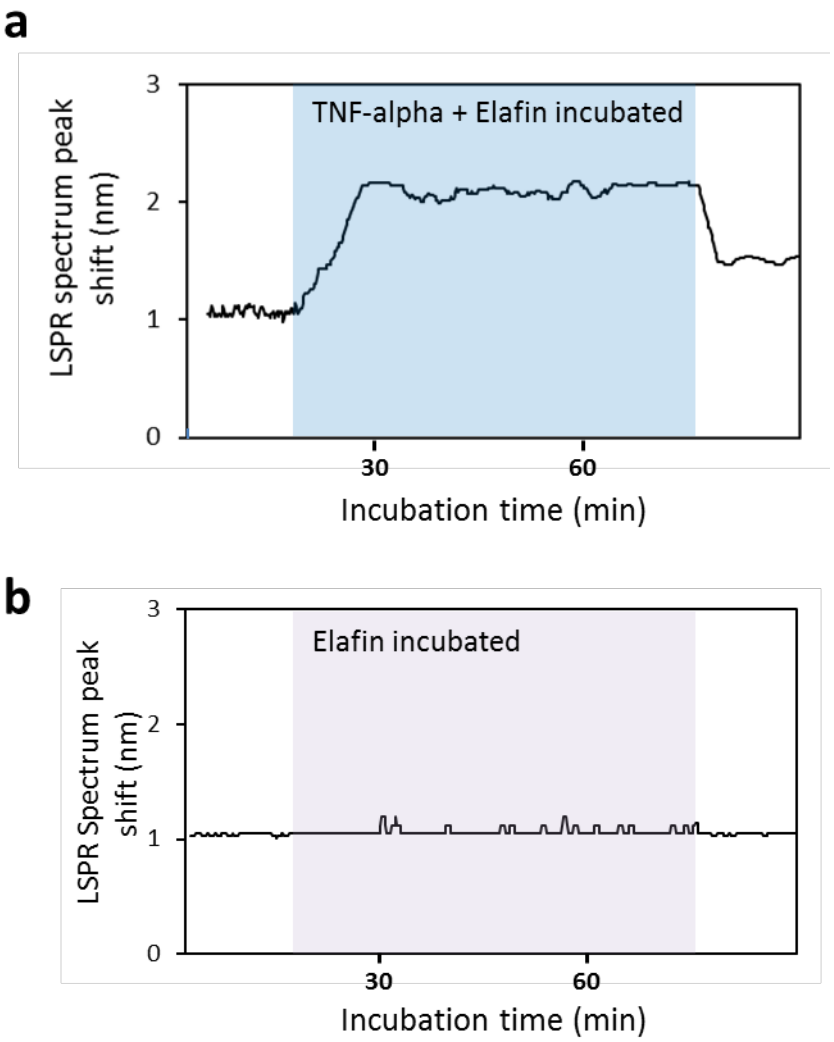

Figure S3. (a) Real-time LSPR spectrum peak shift upon loading a mixture of 250ng/mL of TNF-α and 250ng/mL of elafin to the detection surface of the device. The detection surface was prepared with Anti-human TNF-α serving as the probe antibody, followed by a blocking process with 1% BSA and cacein. The blue region represents a 1h-incubation process of the mixture sample. The effective spectrum peak red-shifted by ~0.3 nm after washing the detection surface. (b) Real-time LSPR spectrum peak shift upon loading 250ng/mL of purified elafin to the same detection surface as in a. The purple region represents a 1h-incubation process of the elafin sample. Loading only elafin cytokines resulted in unnoticeable LSPR spectrum peak shifts.

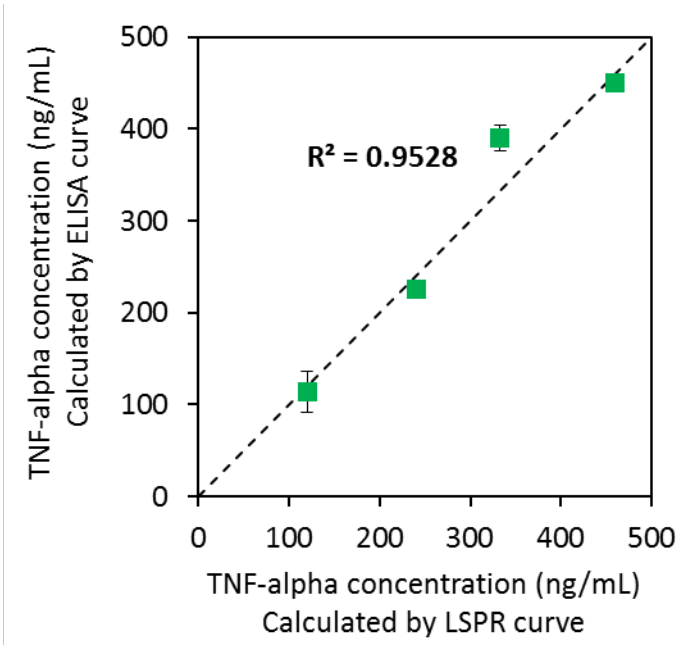

Figure S4. TNF-α concentration obtained by the conventional ELISA technique versus TNF-α concentration detected using the integrated LSPR optofluidic platform for the same TNF-α sample of three unknown concentrations. A high correlation ($R^2 = 0.9528$) was obtained between the data from the two different methods, which validates the performance of our device for LSPR biosensing.