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


# Supplementary information

## An Integrated Adipose-Tissue-On-Chip Nanoplasmonic Biosensing Platform for Investigating Obesity-associated Inflammation

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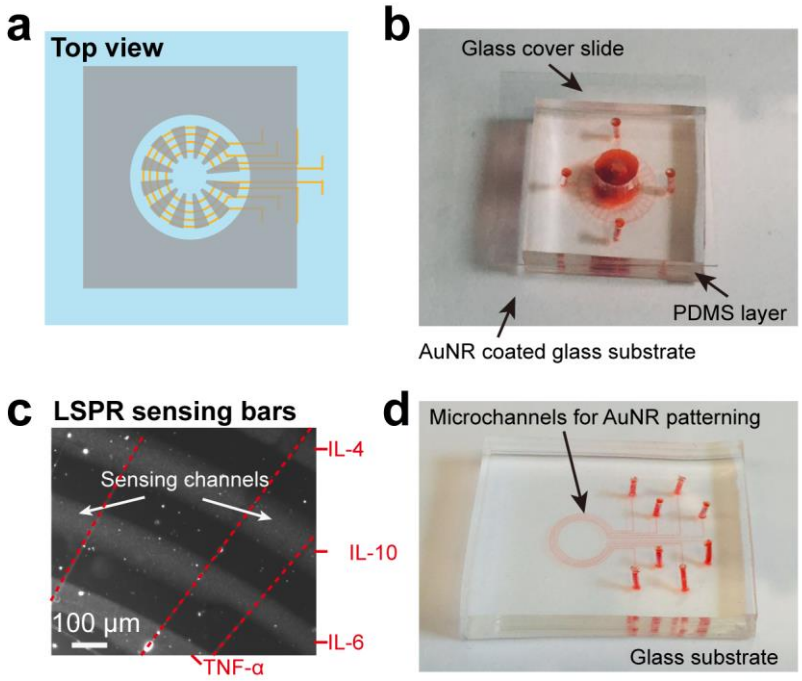


**Figure S1.** (a) Top view schematic and (b) photo image of the integrated Adipose-Tissue-On-Chip Nanoplasmonic Biosensing Platform. The PDMS layer has a 4 mm diameter cell culture chamber at its center. At the bottom of the PDMS, the cell culture chamber was surrounded by 1000 μm long, 200 μm wide microchannels. The cell culture PDMS layer were covered by the glass substrate with its AuNR sensor patterns orthogonal to the surrounding micro-channels. (c) Dark-field images of the LSPR sensing bars taken during the measurement. The micro-channels can be clearly identified from the images. (d) Photo image of microfluidic chip for fabricating the four circular AuNR nanoplasmonic biosensing barcodes. The surfaces of the AuNRs were conjugated with antibodies targeting four different types of cytokines (IL-4, IL-10, IL-6 and TNF-α).

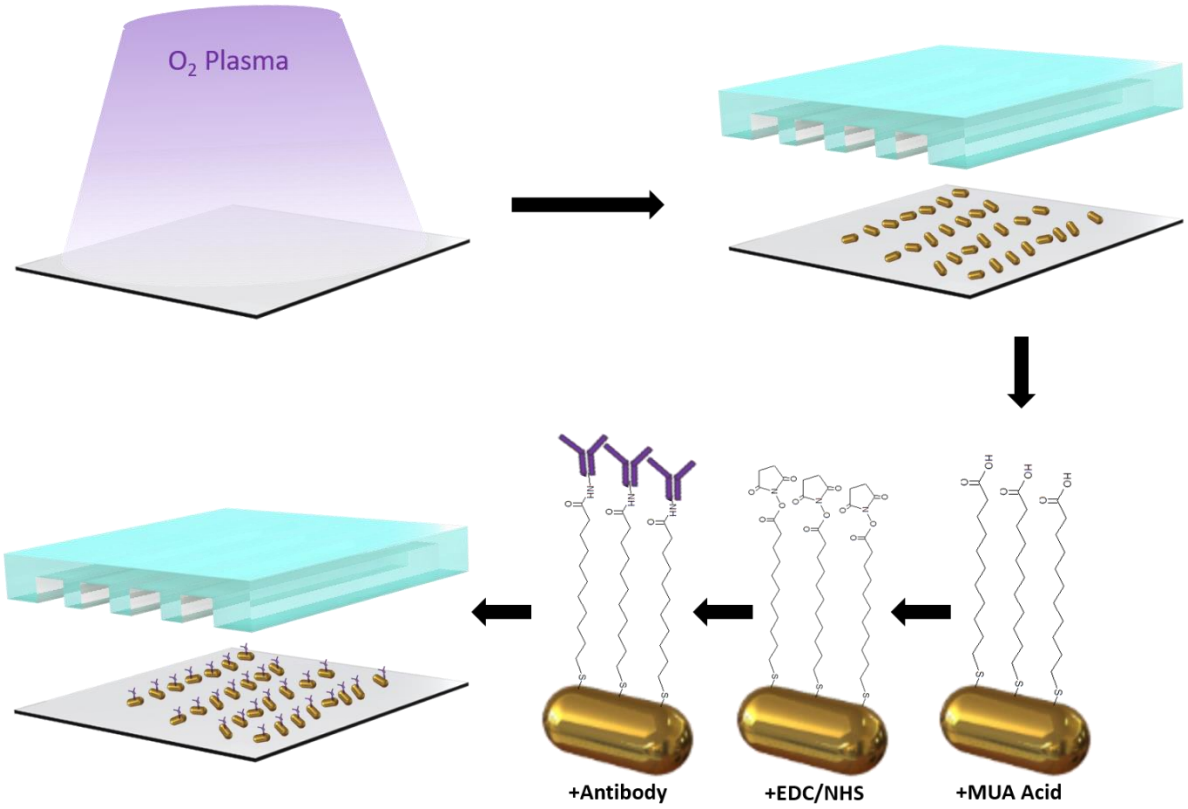


**Figure S2.** The fabrication of LSPR Nanoplasmonic Biosensor Microarray.

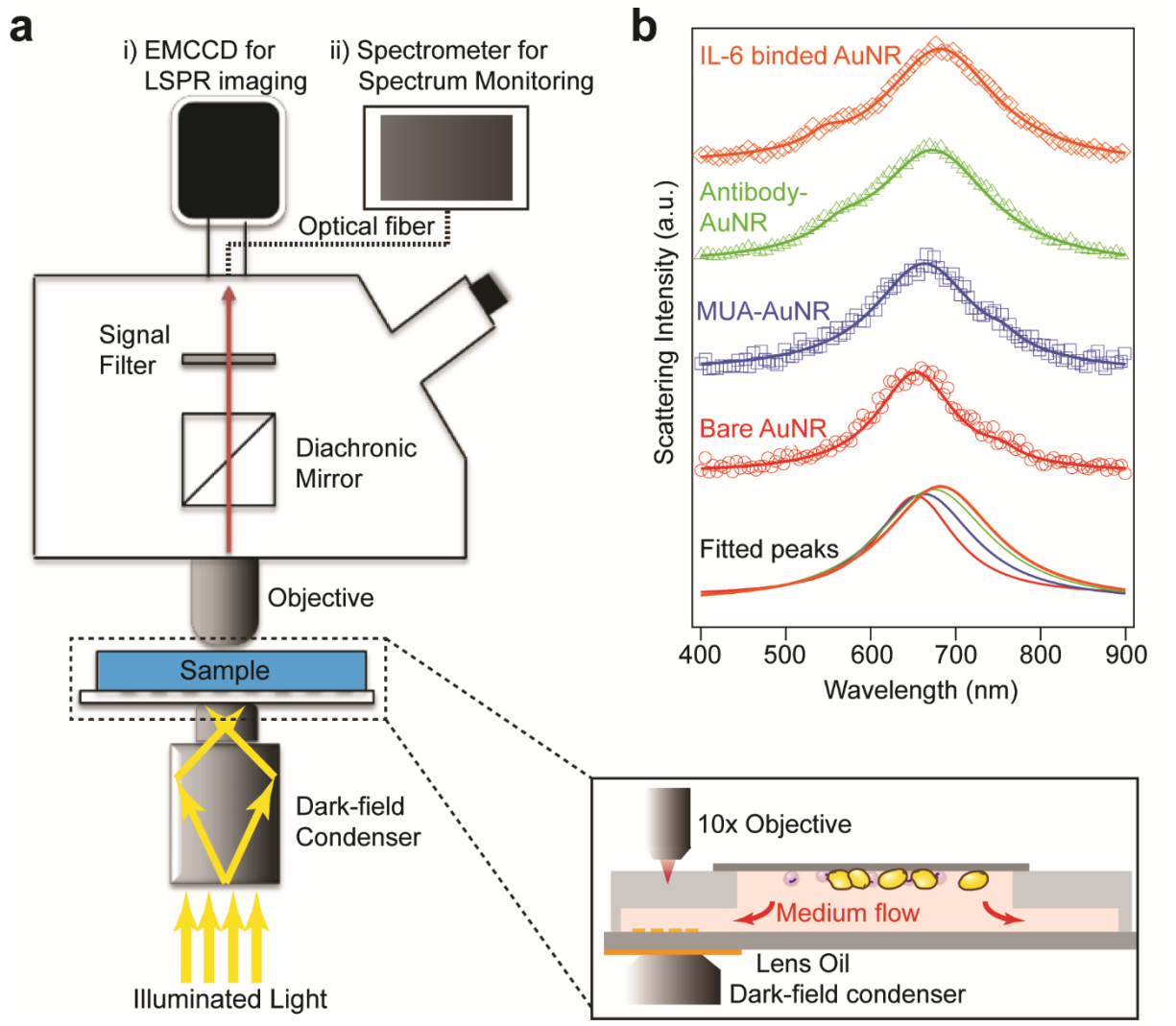


**Figure S3.** (a) Schematic of the dark-field microscope setup used for this study. The C-mount camera port of the microscope was connected to i) an EMCCD for the LSPR imaging measurement, or ii) a fiber spectrometer to monitor the scattering spectrum shift of the AuNRs (b) Normalized LSPR scattering spectra during each bio-conjugation step of the AuNR surface functionalization and the detection of 10 ng/mL IL-6 cytokine solution. The dots are data recorded by the spectrometer, and the solid lines are Lorentzian fitting of the data. The dominate peaks of each spectrums are plotted together at the bottom.

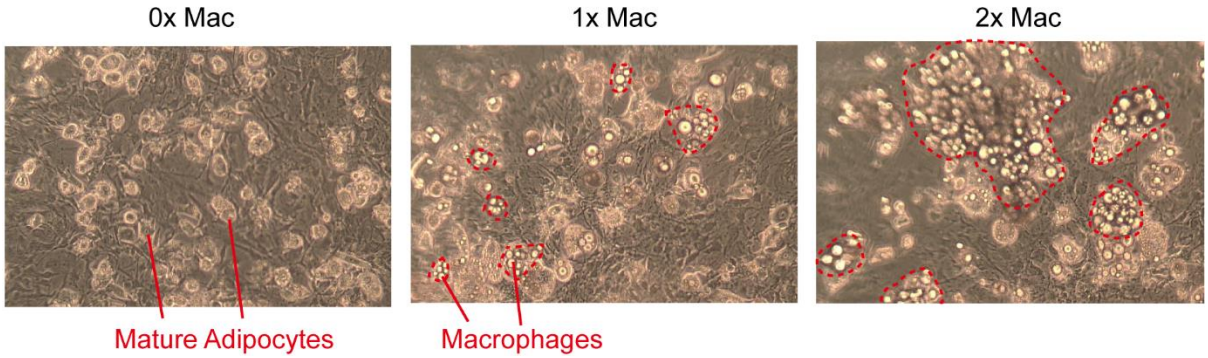


**Figure S4**. Optical microscope of on-chip crown-like-structure (CLS) formation with different amount of J7 macrophages. The CLSs were cycled out by red dashed lines. Clearly, in the device without adding macrophages, no CLS was observed. With the adding of increasing amount of J7 macrophages, the areal density of the CLS also increased. The CLS index calculated for 1x Mac and 2x Mac conditions were 273 and 636 CLS/cm$^2$, respectively.

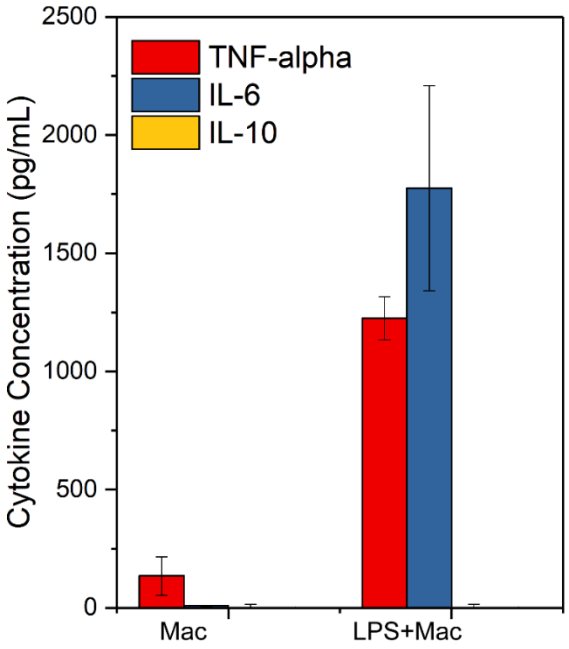


**Figure S5**. Cytokine secretion profile of J7 macrophage cells before and after stimulation with 10 ng/mL LPS.