

Supporting information

Bioplasmonic Paper Mediated Rapid Urinalysis for Label-free Detection of Kidney Cancer Biomarkers

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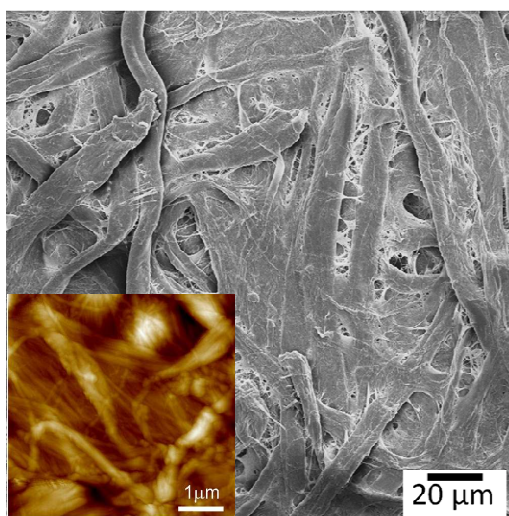


Figure S1: SEM image of the filter paper (Whatman #1). Inset: the higher magnification AFM image of the hierarchical fibrous morphology of the filter paper with cellulose nanofibers braided into microfibers (average diameter of $\sim 0.4 \mu\text{m}$).

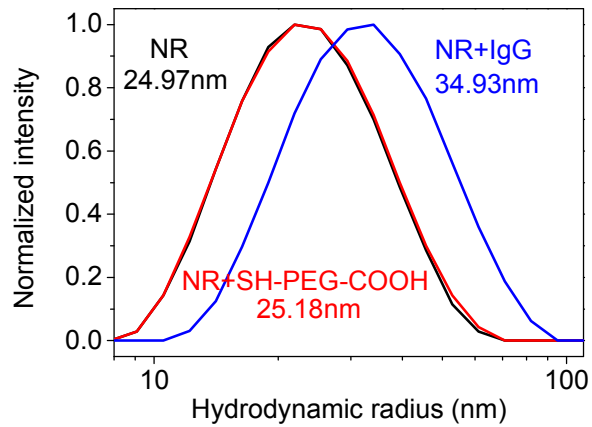


Figure S2: Dynamic light scattering (DLS) measurements showing the hydrodynamic diameter of AuNRs, AuNRs-PEG-COOH, and AuNRs-PEG-IgG. The size distribution confirmed the conjugation of SH-PEG-IgG on AuNRs, and the increase in hydrodynamic diameter mainly contributed from IgG (Mw=150KDa), but not PEG (Mw=5KDa) due to their significant difference in molecular weight.

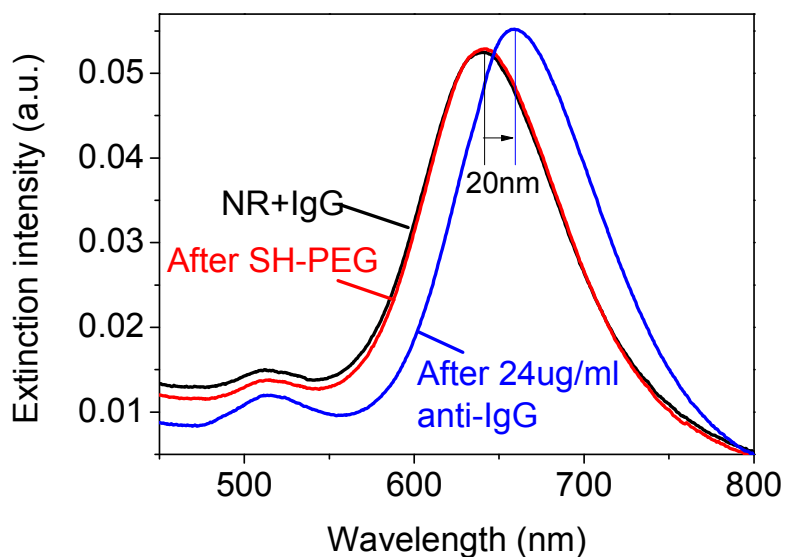


Figure S3: LSPR spectra of AuNR-IgG conjugates on a glass substrate (black), after SH-PEG nonspecific blocking step (red), and after binding of anti-IgG (blue).

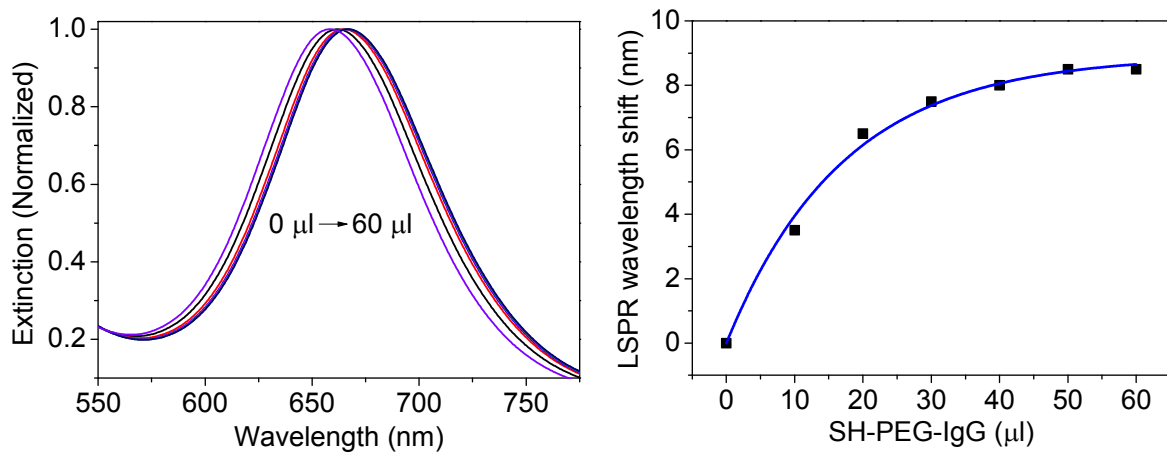


Figure S4: Extinction spectra of AuNR solution after adding different amount of SH-PEG-IgG to optimize the coverage of IgG on AuNR surface.

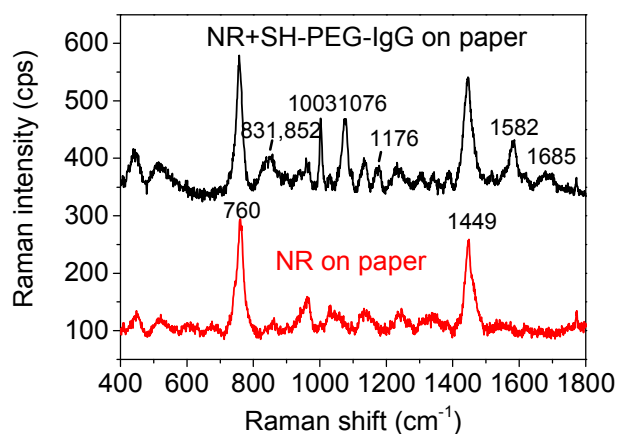


Figure S5: Raman spectra confirmed AuNR+IgG conjugates on paper substrates after incubation. The presence of IgG is evidenced by specific bands at 831 cm^{-1} , 852 cm^{-1} and 1176 cm^{-1} , 1004 cm^{-1} and 1582 cm^{-1} , 1076 cm^{-1} , and 1685 cm^{-1} due to tyrosine, phenylalanine, symmetric stretching vibration of $\nu_3\text{PO}_4^{3-}$, and Amide I, respectively.

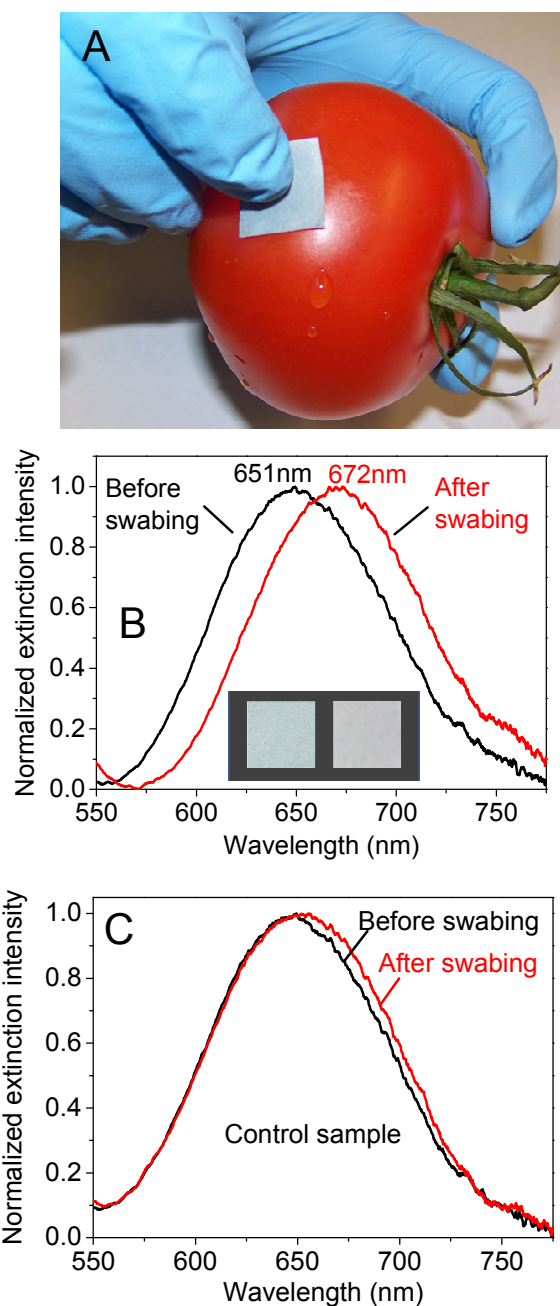


Figure S6: (A) Photograph depicting the flexibility of bioplasmonic paper as it is being swabbed on a tomato to collect 12 μg anti-IgG spread on the surface. (B) LSPR spectra of AuNR-IgG conjugates paper before and after collecting anti-IgG (inset: shows photographs of the NR+IgG paper before (left) and after swabbing (right)). (C) LSPR spectra of AuNR-IgG conjugates paper before and after swabbing on the region without anti-IgG.