Supporting information for

Low-cost Replication of Plasmonic Gold Nanomushroom Arrays for Transmission-mode and Multichannel Biosensing

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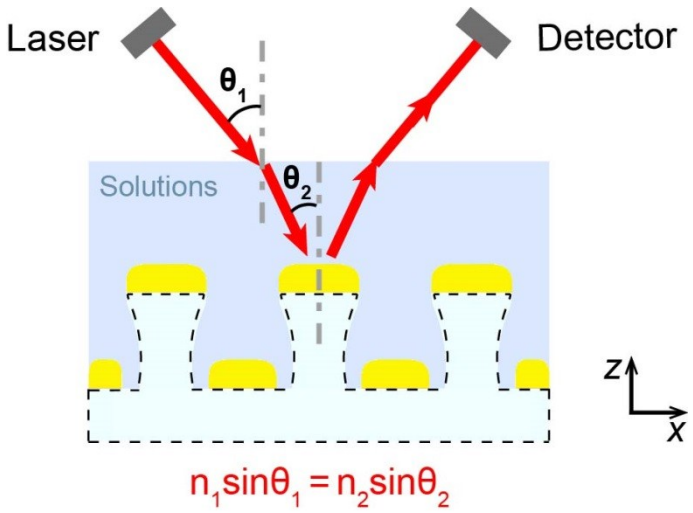

Figure S1. The R-LSPR measurement geometry shows the oblique optical path for detection of analytes in solution on GNMA substrate.

According to the Snell' law, the incidence angle (θ_2) in solution was resolved by θ_1 and n_2. To apply an oblique R-LSPR system (Figure S1), people have to solve two major problems to keep θ_2 unchanged: on the one hand, the θ_1 needs to be readjusted when the dissolvent with different RI was substituted; on the other one hand, RI of the solutions varies as the concentration of the analyte got changed, which is unknown and hardly fed forward to adjust the θ_1, and will introduce systematic errors inevitably. In contrast, in a normal T-LSPR system, because θ_1 is zero, θ_2 do not suffered from these problems (Figure 3B). Therefore, the normal T-LSPR system we proposed is more convenient and reliable.

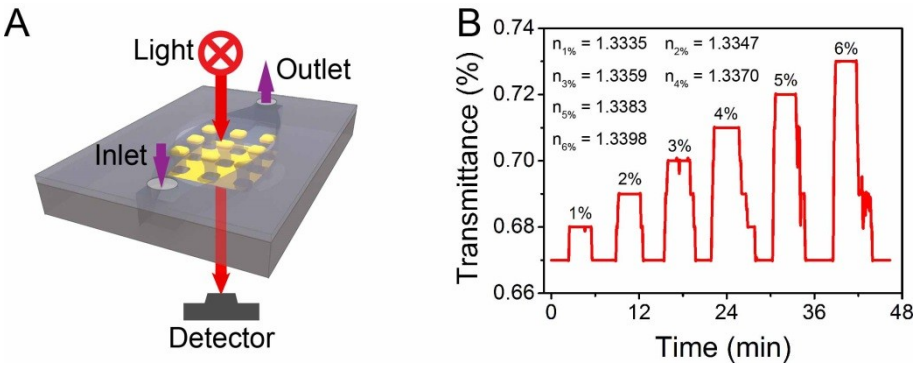

Figure S2. (A) Microfluidic device employed for all transmittance spectrum measurements. (B) Real-time monitoring the concentration changes of Glc solutions. The wavelength for the time-resolved transmittance measurement was fixed at 820

nm. The transmittance of the LSPR sensor increased linearly with the redshift of transmission peak when it was exposed in different concentration of the Glc solutions[1].

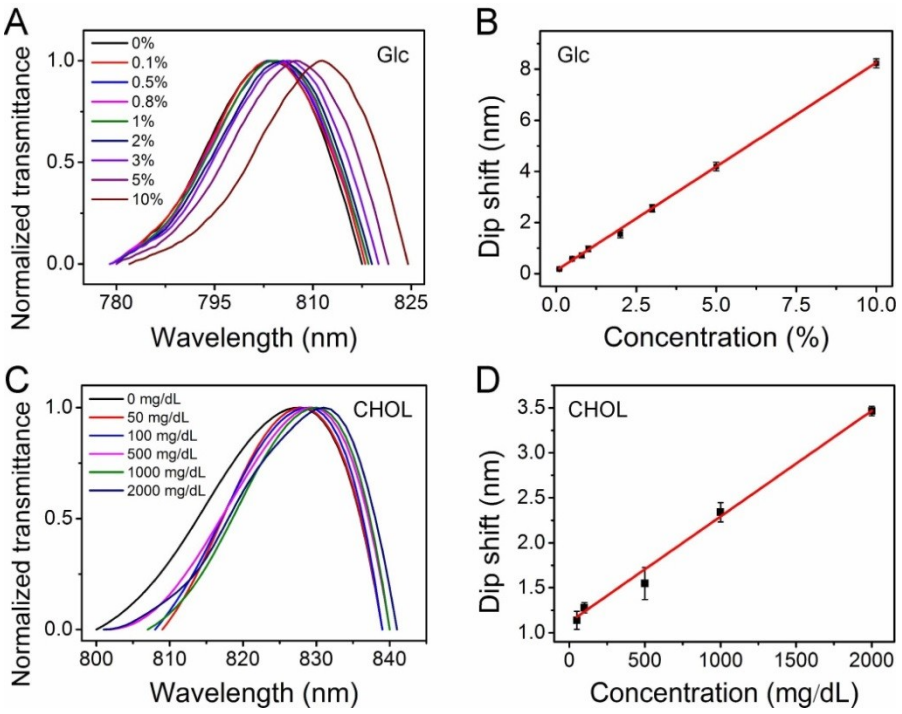

Figure S3. Glc and CHOL detection. (A) Transmittance spectra of the GNMA when it was exposed to different concentrations of Glc solution. (B) Relationship between the peak shift and Glc concentration. (C) Transmittance spectra of the GNMA when it was exposed to different concentrations of CHOL ethanol solution. (D) Relationship between the peak shift and CHOL concentration. The straight red lines in (B) and (D) are linear fit. The error bars represent s.d. calculated from three data points measured at each concentration.

For glucose detection, normal transmittance spectra were measured when different concentrations of glucose solution were injected into the chip channel. (Figure S3A). The resonance wavelength redshifts as the concentration of glucose increases. Figure S3B shows the variation of the spectral position of the peak against Glc concentration. The red shift of the peak ranges from 0.18 to 8.23 nm as Glc concentration is increased from 0.1 to 10 wt%. The LOD is determined to be 0.068% (S/N = 3) (calculated to be ~67.9 mg/dL). It was below the concentration (70 - 125

mg/dL) in plasma of healthy people who is on an empty stomach.

For cholesterol detection, CHOL was dissolved in ethanol for measurement due to the solvent-resistant of NOA, while the previous GNMA based on photoresist prevents substrate from CHOL detection because the photoresist is incompatible with organic solvents. Figure S3C shows the normal transmittance spectrum measured when the GNMA was covered with different concentrations of CHOL. Peak shift in each concentration of CHOL was plotted in Figure S3D. The red shift of the peak ranges from 1.13 to 3.46 nm as CHOL concentration is raised from 50 mg/dL to 2,000 mg/dL. The LOD for CHOL is estimated to be 92.5 mg/dL. It was below the concentration (~200 mg/dL) in plasma of healthy people who is on an empty stomach.

Reference

1 N. Liu, M. Mesch, T. Weiss, M. Hentschel and H. Giessen, Nano Lett., 2010, 10, 2342-2348.