SUPPLEMENTARY MATERIAL FOR

Slab waveguide-based particle plasmon resonance optofluidic biosensor for rapid and label-free detection

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1. *Sensing length dependent analysis*

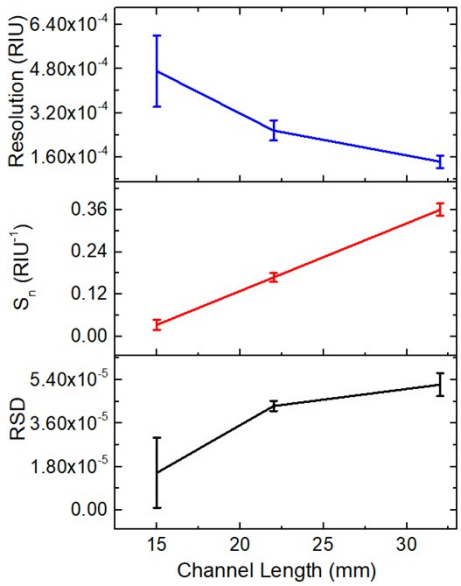

Figure S1. Plots of (a) sensor resolution, (b) normalized sensitivity, and (c) system noise with respect to the channel length. Three measurements were performed to determine the mean values and standard deviations as error bars.

Figure S1 shows the sensor resolution, normalized sensitivity, and system noise of the WGPPR sensors with different sensing lengths, respectively. As the sensing length increases, the sensitivity increases due to the elongated interaction length, while the relative standard deviation (RSD) remains almost unchanged due to the excellent stability of our system

2. ***Detection of Kinetic constants***

Kinetic constants of antigen-antibody binding reaction using the differential equations

$$\frac{dI_{(t)}}{dt} = K_a C I_{\min} - (K_a C + K_d) I_{(t)} \tag{S1}$$

On solving the above equation, the obtained solution is

$$\ln\left[\frac{\left(I_t - I_{eq}\right)}{\left(I_0 - I_{eq}\right)}\right] = -\left(K_a C + K_d\right)t \tag{S2}$$

where I_t is real time intensity of signal, I_{eq} is steady state signal intensity and I_0 is the signal intensity in blank buffer solution.

The logarithmic function in the above equation is a linear function of time as shown in the figure below when the antigen concentration (C) is specified. Then the slope of the plot is equal to $k_a C + k_d$. Using at least two antigen concentrations, a plot of slope versus C will yield k_a and k_d values. Therefore, association (k_a) and dissociation (k_d) constant using antigen concentrations of 1 μg/mL (6.66 nM) and 2 μg/mL (13.33 nM) were obtained as 1.14×10^{6} $M^{-1}s^{-1}$ and 1.68×10^{-2} s^{-1}, respectively. The formation constant of binding system was calculated as:

$$K_f = \frac{k_a}{k_d} \tag{S3}$$

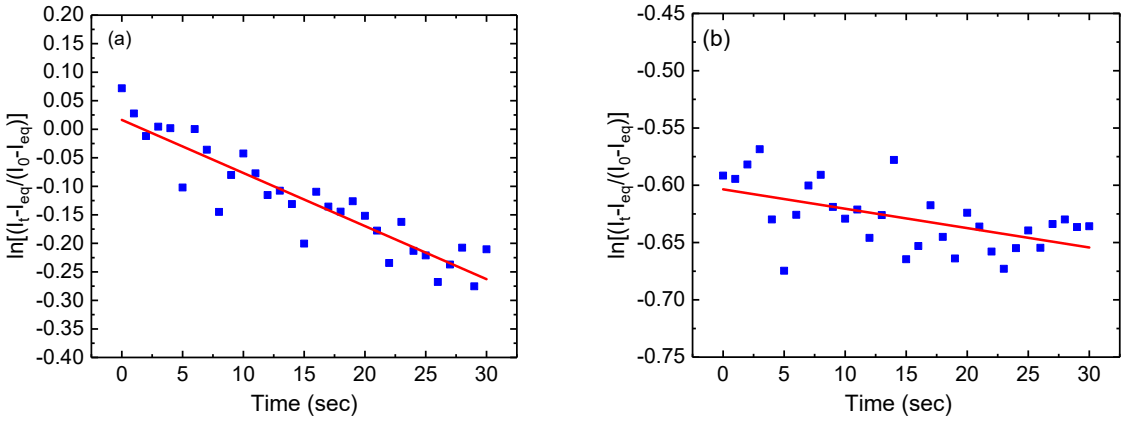

Fig. S2. Linear fitting of logarithmic equation using antigen concentrations of (a) 1 μg/mL (6.66 nM) and (b) 2 μg/mL (13.33 nM).