

Supplementary Materials: Surface Plasmon Resonance-Based Immunosensor For IgM Detection With Gold Nanoparticles

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The effect of pH on IgM detection using the I-SPR sensor was examined in the range of pH 4.0-8.0 (Figure S1). The sensing surface was equilibrated with the desired pH buffer solutions after that 100 ng/mL IgM solution was interacted with I-SPR sensor.

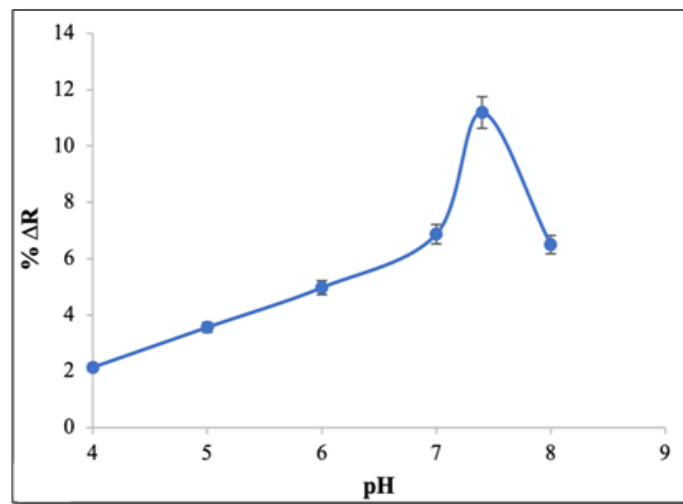


Figure S1. The effects of pH on the detection of IgM using I-SPR sensor (flow rate: 150 μ L/min, 100 ng/mL IgM solution and T: 25 $^{\circ}$ C).

Adsorption isotherm models can be used to understand the adsorption behavior during the adsorption process, thereby, the Langmuir, the Freundlich and the Langmuir-Freundlich adsorption isotherm models were investigated to understand the binding event manners of IgM. The Langmuir adsorption model is a homogenous adsorption model and defines the occurrence of adsorption on a monolayer surface with equal binding sites, whereas the Freundlich adsorption model defines a heterogeneous adsorption on a heterogeneous surface. The Langmuir-Freundlich adsorption model is generally used to understand the adsorption behavior of molecular imprinting studies and is a useful model over the high concentrations. Hence, we used 3 adsorption isotherm models and the Langmuir, the Freundlich and the Langmuir-Freundlich models were calculated with Eqs. (1), (2), and (3), respectively.

$$\Delta R = [\Delta R_{\max} (C) / K_D + (C)] \quad \text{Eq (1)}$$

$$\Delta R = [\Delta R_{\max} (C)^{1/n}] \quad \text{Eq (2)}$$

$$\Delta R = [\Delta R_{\max} (C)^{1/n} / K_D + (C)^{1/n}] \quad \text{Eq (3)}$$

Herein, C; IgM concentration (ng/mL), ΔR_{\max} ; the sensor response, K_D ; equilibrium dissociation constant and $1/n$; the Freundlich exponent.

According to experimental results (Table S1), the binding manners of IgM and I-SPR obeyed the Langmuir adsorption model with a monolayer surface and equal binding sites with a high R^2 (0.99) value.

Langmuir model with ΔR_{\max} equals 12.5 is found to be the most appropriate modal to identify the interaction between IgM molecules and I-SPR sensor.

Table S1. The results of the Langmuir, the Freundlich and the Langmuir-Freundlich adsorption isotherm models.

Langmuir		Freundlich		Langmuir- Freundlich	
ΔR_{\max}	12.5	ΔR_{\max}	4.15	ΔR_{\max}	19.26
K_A , ng/mL	0.033	1/n	0.54	K_A , ng/mL	0.028
K_D , mL/ng	30.01	R^2	0.85	K_D , mL/ng	35.37
R^2	0.99			R^2	0.94