

Interaction between Gold Nanoparticles, Membranes and Proteins: A Surface Plasmon Resonance Study

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Supporting information

1. Dissociation constant (k_{off})

The interaction between nanoparticles and different kind of proteins immobilized on the sensor surface was analyzed using the dissociation constant (k_{off}). First, the interactions between nanoparticles and proteins were observed through kinetic curves where the dissociation step was used to obtain the k_{off} .

The dissociation step on the kinetics curve (**figure 1**) was fitting using the equation 1. Where Rd is the response of the dissociation step, Ro is the exponential gain and k_{off} is the dissociation constant.

$$Rd = Ro \cdot \exp^{-k_{off} \cdot t} \quad \text{equation 1}$$

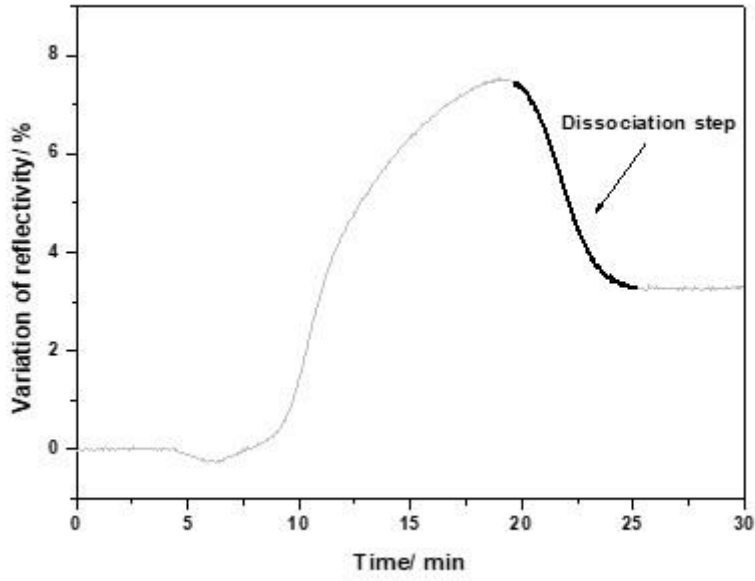


Figure S1: Kinetic curve of the interaction between nanoparticle and protein. Dissociation step (black).

2. Surface Concentration Density (Γ)

The interaction between successive injections of nanoparticles and different types of membrane was analyzed to obtain the surface concentration density (Γ).

The greater reflectivity variation corresponds to the highest concentration on the sensor surface, therefore, this value is used to obtain Γ .

Firstly, it was determined the decay length (l_d), equation 2.

$$l_d = \frac{\lambda/2\pi}{[-n_{eff}^4/(n_{eff}^2 + \epsilon_{metal})]^{1/2}} \quad \text{equation 2}$$

Where n_{eff} is the refractive index measured in the equipment, ϵ_{metal} is the characteristic parameter of the metal and λ is the wavelength.

The equation 3 describe the thickness of the sensor surface layer.

$$d = -\left(\frac{l_d}{2}\right) \ln \left(1 - \left[\frac{n_{eff} - n_b}{n_a - n_b}\right]\right) \quad \text{equation 3}$$

Where d is the thickness of the sensor surface layer, n_b is the refractive index of the solvent and n_a is the refractive index of the material used.

The equation 4 describe the surface concentration density (Γ).

$$\Gamma = d \left(\frac{n_a - n_b}{d_n/d_c} \right) \quad \text{equation 4}$$

Where d_n/d_c is the Increment refractive index of gold nanoparticles. This parameter is the slope obtained on the analytical curve. This analytical curve was obtained analyzing the refractive index of different concentrations of gold nanoparticles (figure 2)

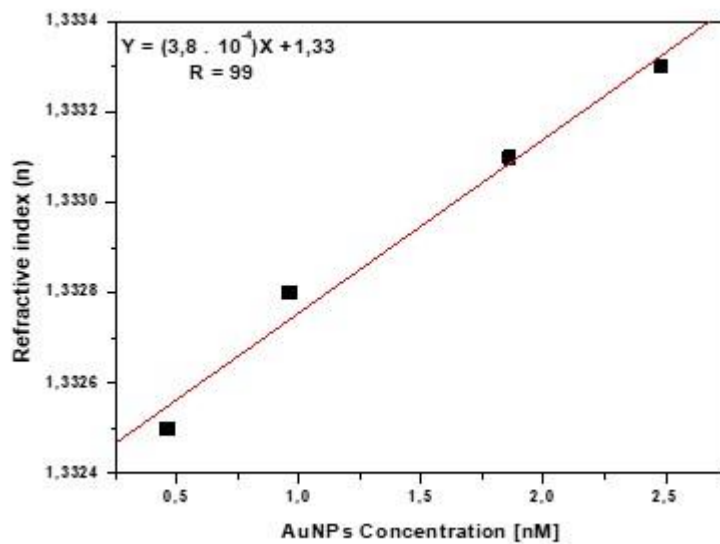


Figure S2: Measurement of refractive index at varied concentrations of gold NPs. The slope is the parameter dn/dc .