Real time affinity biosensor onto insulated polymer using electric impedance spectroscopy in dielectric microchip

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Statistical study

In general 3 experiments were taken into account in order to calculate dispersion parameters as standard deviation and variation coefficient (RSD). The last column in Table S1 shows the percentage variation of the interfacial impedance modulus when recognition reaction was taking place. Indeed the interfacial impedance variation on a surface coated with BSA is in a linear relationship with added Ab-BSA.

Table S1. Statistical study for interfacial modulus impedance measured for PET coating with BSA at 1×10^{-7} M and then for the biomolecular recognition by using different Ab-BSA concentrations from 1.2×10^{-8} M to 1.2×10^{-7}.M.

C_{BSA}[i] $\times10^{-7}$ M	Z_{BSA}[ii] $\times10^{6}$ Ω	σ_{Z_BSA}[iii] $\times10^{6}$ Ω	$C_{Ab\text{-}BSA}$[iv] $\times10^{-8}$ M	$Z_{Ab\text{-}BSA}$[v] $\times10^{6}$ Ω	σ_{Z_Ab-BSA}[vi] $\times10^{6}$ Ω	RSD[vii] %	variation[viii] %
1	14.60	0.070	1.2	14.75	0.070	0.48	1.03
			4	14.81	0.077	0.52	1.44
			5	15.19	0.065	0.43	4.04
			8	16.16	0.046	0.29	10.68
			12	18.10	0.054	0.30	23.97

Table S2. Association and dissociation kinetic rate constants determined for biomolecular recognition between BSA and Ab-BSA at various concentrations

$C_{Ab\text{-}BSA}$ (M)	$k_{on}\times10^{4}$ (s^{-1})	$k_{off}\times10^{-4}$ ($M.s^{-1}$)	$K_{BSA/Ab\text{-}BSA}\times10^{7}$ (M^{-1})
$1.2\ 10^{-8}$	19	110	(5.15±1.45)
$4\ 10^{-8}$	9	30	
$5\ 10^{-8}$	8	20	
$8\ 10^{-8}$	6	6	
$1.2\ 10^{-7}$	5.5	8	

[i] The used BSA concentration in flow channel for PET coating, C_{BSA}

[ii] The interfacial impedance modulus mean value obtained at PET surface saturation, $\overline{Z_{BSA}}$

[iii] The standard deviation of $Z_{\_BSA}$, $\sigma_{Z\_BSA}=\sqrt{\frac{1}{n}\sum_{i}^{n}(Z_{BSA}-\overline{Z_{BSA}})^{2}}$

[iv] The used Ab-BSA concentration in flow channel for BSA recognition.

[v] The interfacial impedance modulus mean value obtained at equilibrium, $\overline{Z_{Ab-BSA}}$

[vi] The standard deviation of $Z_{Ab\text{-}BSA}$, $\sigma_{Z\_Ab-BSA}=\sqrt{\frac{1}{n}\sum_{i}^{n}(Z_{Ab-BSA}-\overline{Z_{Ab-BSA}})^{2}}$

[vii] The coefficient variation obtained for $Z_{Ab\text{-}BSA}$, $\%RSD=\frac{\sigma_{Z\_Ab-BSA}}{\overline{Z_{Ab-BSA}}}\times100$

[viii] % variation of Signal $=\frac{\overline{Z_{Ab-BSA}}-\overline{Z_{BSA}}}{\overline{Z_{BSA}}}\times100$