Self-assembled monolayer of push-pull chromophore on gold: towards the modulated polarization for the controlled detection of biomolecules

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The specific detection of antibodies using antibody/antigen binding interactions has been the subject of numerous studies in the field of biosensors [1-3]. Among the different approaches, a promising functional ON/OFF system has been proposed based on the reversible modification of the conformation of a charged oligopeptide by the application of an electrical potential on the surface, thus making it possible to control the antibody-antigen interaction [4]. So far, this system can only respond to a single electrical stimulus, thus limiting its use to a single antibody/antigen pair. To overcome this scientific obstacle, we propose to develop an alternative system allowing the detection of the binding interaction of several antibody/antigen pairs within a single platform.

For this purpose, we are considering an original approach based on the use of "push-pull" chromophores to control the potential allowing the conformation of the oligopeptide to be switched between the OFF state (antibody-antigen interaction not allowed) and the ON state (interaction permitted). This structure of the push-pull chromophores forms an electrical dipole depending on the nature of the donor and attractor groups, and the π-conjugated bridge. The idea is to add push-pull chromophores presenting different electrical dipole moments - each one being associated to a specific electrical potential value - between the surface and the oligopeptide supporting a given antigen, and to insert these systems within an inert matrix of molecular compound of oligoethylene glycol (OEG).

References:

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