Force spectroscopy for *Citrus Tristeza Virus* antigen/antibody immobilized at SiO_x surface

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The understanding of the functioning of biological systems by biomolecular interactions was facilitated due the convergence of nano-scale science with modern biology and bioanalytical chemistry. One tool widely used for this issue is AFM (*Atomic Force Microscopy*), which can be a powerful method to measure interaction forces of receptor-ligand pairs [1]. A fundamental prerequisite for this technique is the immobilization of ligand and receptors on the tip and sample respectively. The immobilization of receptors on a semiconductor surface, for example Si, has particular interest for biosensors based in field-effect transistor (MOSFETs) [2,3].

In this work, we study the immobilization of antigen *CB22* (receptor) and antibody *37.D.09* (ligand) of *Citrus Tristeza Virus* (CTV) at a SiO_x semiconductor surface. This virus affects citrus plants and their early detection have a large economical impact on local economy; we are thus interested in building a sensor with high sensitivity and the immobilization is the first step towards this goal. The SiO_x surface was functionalized by *AminoPropilTrietoxi-Silano* (APTES), a reagent widely used to this purpose. ELISA immunochemical assays have shown an efficient immobilization on SiO_x, and also an efficient block mechanism of these molecules using casein. Once the immobilization is confirmed, topographical AFM images were carried out to verify the uniformity of molecular film in different stages.

Using the same procedure, antibodies were immobilized at AFM tips for interaction force measurement with antigens on the SiO_x surface. A force difference was observed between active and inactive (blocked with the antigen) tips; this result, confirms that the antigens and antibodies were immobilized at both surfaces and that they are still active for their specific biological interaction.

References:

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