INVESTIGATION OF SARS-COV-2 OMICRON SPIKE PROTEIN REAL-TIME INTERACTIONS WITH SPECIFIC MONOCLONAL ANTIBODIES

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Since the beginning of 2020, people
's lives have been profoundly changed by the rapid spread of the SARS-CoV-2 virus, which can cause COVID-19 – a disease associated with pneumonia and multiorgan failure [1]. Due to the rapid spread of the disease, it has become important to understand how the structural proteins of the virus bind to specific antibodies. The huge number of infections and deaths made such studies essential. A particularly important area in this context is the development and application of immunosensors. All immunosensors are based on the specificity of molecular recognition of antigens or antibodies. Immunosensors can be subdivided according to the detection principle used. The main sensors developed are electrochemical, optical, and acoustic immunosensors [2].

SARS-CoV-2 Spike protein is composed of two functional subunits. One of those subunits has a receptor binding domain (RBD), which is responsible for binding the virus to the host cell receptor. This study aimed to use a combined method of spectroscopic ellipsometry (SE) and quartz crystal microbalance with dissipation (QCM-D) to investigate the interaction between SARS-CoV-2 spike protein and specific antibodies and to assess the formed immune complex thermodynamic properties. The results obtained from SE allowed to assess the thickness of monolayers and to calculate the surface mass density of dry proteins and the data acquired from QCM-D allowed to calculate the surface mass density of wet proteins and the amount of PBS in the monolayers and to assess the viscoelastic properties of the formed monolayers. The results present that the monolayer of immobilized monoclonal antibodies was found to be rigid, while the monolayer of antigens formed during their interaction with antibodies presented viscoelastic properties.

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