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PEPTIDE FILM IN A PLATFORM FOR CA19-9 IMMUNOSENSOR

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Introduction: Early detection of diseases such as pancreatic cancer requires new devices that need to be inexpensive, easy to handle, with rapid, sensitive and selective responses, and that can be used outside specialized laboratories (i.e. point-of-care). This is possible with capacitive immunosensors made of nanostructured peptide films containing an active redox molecule because they are stable and have controllable physicochemical properties. Objective: This work is aimed at detecting and quantifying CA19-9, a pancreatic cancer biomarker, using a biosensor made with a matrix containing a peptide film with redox molecules onto which a layer of antibodies was deposited. Material and Methods: Techniques such as Solid Phase Peptide Synthesis (SPPS) were used, while detection was made with capacitance measurements derived from impedance spectroscopy. Polarization-modulated infrared reflection absorption spectroscopy (PM-IRRAS) was also used to characterize the films. Results: Detection of CA19-9 using impedance spectroscopy was achieved with a limit of detection (LOD) of 1.265 U/mL. Antigen-antibody interactions were responsible for the high sensitivity, which could be explained with the Langmuir-Freundlich adsorption model, where the fitting parameters had a heterogeneity index of 0.684 and the saturation capacitance Qsat of 90 U/mL. The essential role played by the molecular organization in the nanostructured films was confirmed with polarization-modulated infrared reflection absorption spectroscopy (PM-IRRAS) measurements. Conclusion: Taken together, the results reported here indicate that peptide monolayers represent a suitable platform to develop biosensors for different antigen/antibody pairs, which may permit advances toward new point-of-care diagnosis systems.