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Impedance Spectroscopy and Surface Plasmon Resonance for C-Reactive Protein Detection

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C-reactive protein (CRP) is a protein present in plasma and is one of the most expressed proteins in acute phase inflammation cases, being a known biomarker of inflammatory states. Detection and quantification of CRP in an easy, cheap, and fast way can improve clinical diagnostics in order to prevent serious inflammatory states.

In this work, we study the electrochemical and optical properties of protein G layer grafted on gold microelectrodes with impedance spectroscopy and surface plasmon resonance imaging techniques for C-reactive protein detection. Two CRP-antibody immobilization methods were used: the first method is based on direct physisorption of CRP-Antibody onto gold microelectrodes; the second one is based on oriented CRP-antibody with protein G intermediate layer. The two developed immunosensors were tested in presence of CRP antigen in phosphate buffer saline solution with impedance spectroscopy and surface plasmon resonance imaging. The reproducibility was tested against five substrates prepared in the same conditions at room temperature. The negative control was obtained after different injection of antigen-rabbit onto gold microelectrode coated only with anti-CRP antibody.

Biography:

Prof. Dr. A. Abdelghani is a Full Professor at the National Institute of Applied Science and Technology (INSAT, Tunisia) working mainly in the field of Microsensors and Microsystems. He obtained the master degrees in "Microelectronic Devices" at the INSA of Lyon (France) in 1994, then a Ph.D thesis from Ecole Centrale of Lyon (France) in 1997. He obtained a post-doc position in Germany between 1997-2000. He obtained the Habilitation in Physics in Tunisia (faculty of Science of Tunis) in 2004 and a Habilitation (worldwide recognition for conducting and leading research) in "Sciences pour l'Ingénieur" in 2009 at the Ecole Normale Supérieure de Cachan (France). He organized three International Conferences in Tunisia in the Field of Nanotechnology (2009, 2012 and 2014) with the Alexander Von Humboldt Foundation (Germany). He is now the leader and principal investigator of a research group working mainly on gas sensors based on functionalized carbon nanotubes (metallic oxides, nanowires, nanoneedles, polymers) and on the development of interdigitated gold microelectrodes integrated in microfluidic cell for bacteria analysis in biologic medium. He published more than 85 papers in International Journals and supervised more than 10 Ph.D thesis and 30 masters student. Prof. Abdelghani is part of worldwide renowned scientists as editorial member of several peer-reviewed scientific journals. He was a coordinator of Science For Peace NATO Project (2009-2011), National science Fondation Project (2009-2013), of Tempus-Project (2013-2016) and coordinator of a recent NATO-SFP project (2013-2016). He is deeply involved in industrial applications in his field of research with implications for the design and the development of affordable and cost-effective sensing devices for diagnostics and theranostics which will have an effective impact in the developing countries.