Two Photon Polymerisation Enabled Plasmonic Sensors for Inflammation Monitoring

Sahil Ghate[4], and Foram Madiyar[1]
[1]Department of Physical Science, [4]Department of Electrical Engineering,
Embry-Riddle Aeronautical University, Daytona Beach, FL

Introduction

The project aims to develop an electrochemical sensor to detect the concentration of a biomolecule through change in impedance. When a biomolecule is close to the LSPR region, it tends to vibrate energetically, changing the impedance. The sensor will measure the change in impendence through Electrochemical Impedance Spectroscopy (EIS). The surface of the sensor is enhanced by nanostructure pyramids for greater surface enhanced plasmonic interaction.

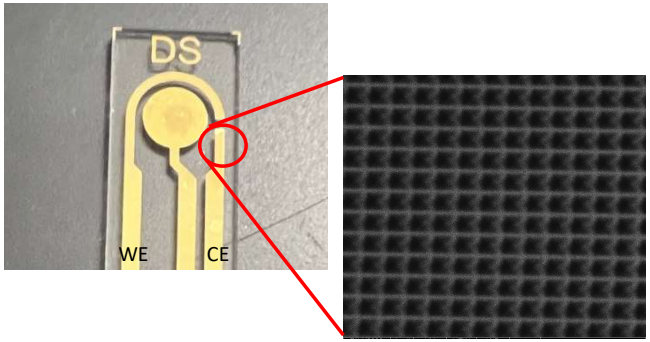

Fig.1:Surface enhancement of the sensor with nano-pyramid

Methodology

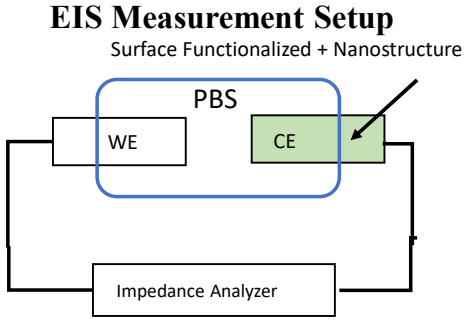

Fig.2: EIS schematic setup

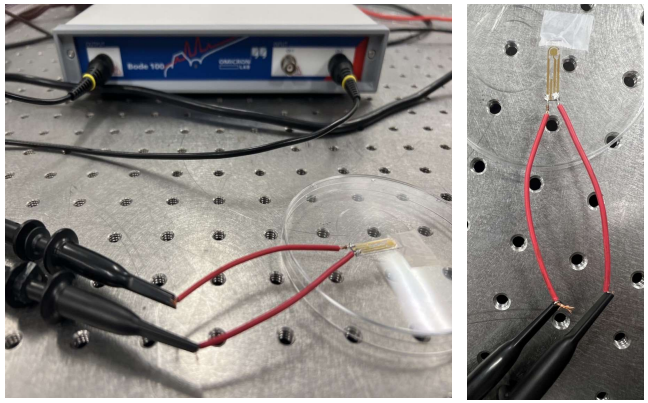

Fig.3: EIS experimental setup

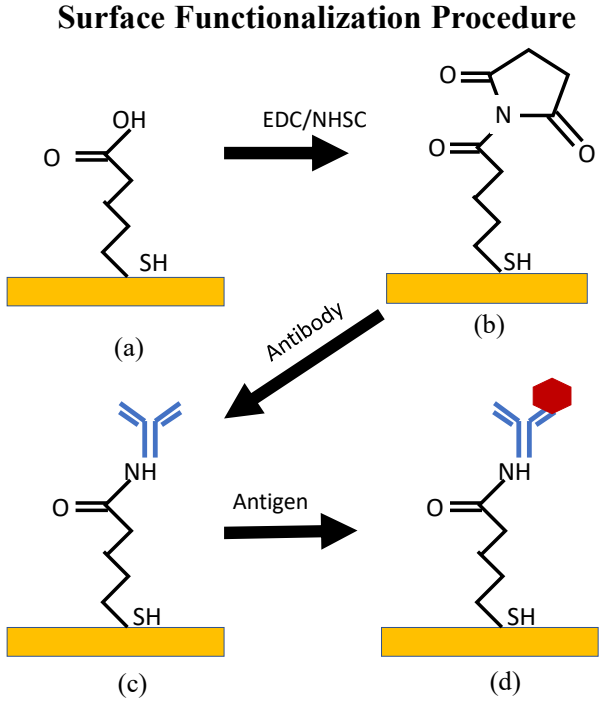

Fig.4: Schematic diagram of functionalization of the gold surface with antibody (a) formation of tightly packed yer using thio compound (b) functionalization with carbodiimide and succinimide chemistry (c) reaction with antibody (d) reaction with antigen

Results

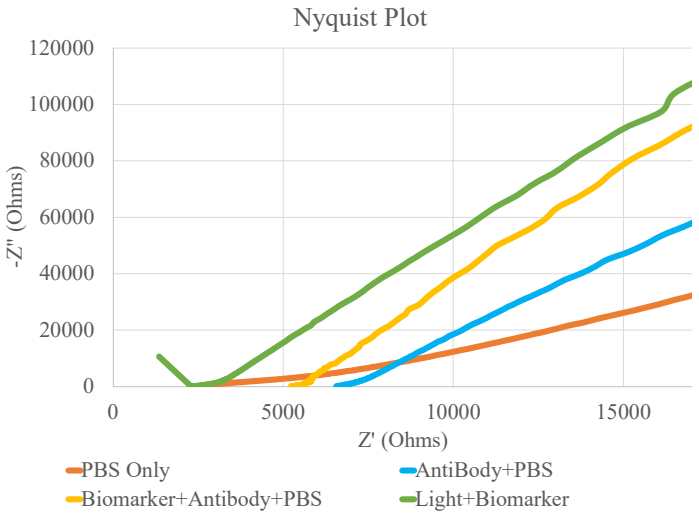

Fig.5: Impedance change through the surface functionalization process with a rudimentary light experiment

Discussion

The preliminary experiment data shows a steady increase in impedance as the surface of the sensor is functionalized. The data from the experiment can be used to calibrate the sensor for the experiment in presence of specific wavelength. A rudimentary experiment with light was conducted after the functionalization of the surface, showing an increase in impedance due to light.

Conclusion

The preliminary experiment shows significant change in impedance when the sensor is in presence of light. Further refinement in experiment methods and repeatability of the experiment will be required for a definite correlation.

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