Synthesis and Electrochemical Behavior of Self Assembled Peptide Monolayers

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INTRODUCTION In last decades, research in metal surfaces modification by forming ordered and structurally molecular layer to obtain stable and functional molecular junctions has been realized. In this context, self-assembled monolayers (SAMs) has been employed to development of different applications going from biosensors to dye-sensitized solar cells[1]. Peptides have proved to be a promising tool for the development of self-assembled monolayers**. OBJECTIVE** Herein we described peptide containing ferrocene (fc) redox group. **MATERIALS AND METHODS** The peptide Ac-Cys-Ile-Ile-Lys(fc)-Ile-Ile-COOH) was synthesized by solid phase (SPPS), to obtain the electrochemically active capacitive interface. The side chain of the cysteine was covalently bound to the gold electrode (sulfur group) and the side chain of Lys was used to attach the ferrocene in peptide chain. After obtaining the purified redox-tagged peptide, the self-assembly and redox capability was characterized by cyclic voltammetry (CV) and electrochemical impedance-based capacitance spectroscopy. **DISCUSSION AND RESULTS** The obtained results confirmed the redox peptide was successfully attached by forming an electroactive self-assembled monolayer onto gold electrode. The surface coverage obtained by CV was (4 ± 2) x 10^{-11} mol cm^{-2}, while capacitance spectroscopy showed a value of (8 ± 4) x 10^{-11} mol cm^{-2}. These values were different of them obtained to the alanine-containing peptide ((12 ± 2) x 10^{-11} mol cm^{-2}). This difference was due to the side chain volume of amino acids in the peptide. The side chain of isoleucine[1] is bigger than alanine[2]. The solid phase peptide synthesis allowed the sequence modification to have a peptide containing an appropriate and desirable redox probe. Electrochemical techniques confirmed that the ferrocene peptide provided the self-assembled monolayers (SAMs) over gold metallic electrode. **CONCLUSION** The stability and electrochemical activity of the device was confirmed through the calculation of molecular coverage. The redox-tagged peptide has an additional possibility by attaching an antibody for development biosensors devices to detect directly any relevant biomarker.

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