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Abstract

Evaluation of Redox Peptide Modified Surfaces for Biosensing Applications †

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Abstract: Peptides are promising tools for designing sensitive and stable biosensors. For example, the redox self-assembled monolayer (SAM) based on the sequence Fc-Glu-$(Ala)_2$-Cys-NH_2 was successful evaluated as transducing interface in electrochemical biosensors. The design of such peptides includes: 1) cysteine to bind covalently the peptide to the gold electrode; 2) glutamic acid in N-terminal position to bind the ferrocene (Fc) in the amine group, and the antibody in the δ-carboxyl group, and 3) alanine to form a hydrophobic layer. Herein, we present the solid-phase synthesis of three different peptides with structure Fc-Glu-$(X)_2$-Cys-NH_2 (X=Ser, Gly or Phe) and the electrochemical behavior of the obtained SAMs. The Gly was chosen because of its smallest side chain, while Ser and Phe present hydroxyl groups (for H-bonds) and aromatic (for π-π interaction), respectively. The synthesis successful of the HPLC purified peptides were confirmed by mass spectroscopy. From cyclic voltammetry and impedance-derived electrochemical capacitance spectroscopy results, all peptides present reversible redox processes, and electron transfer rates (k_{ET}) ranging from 17 to 31 s^{-1}. Since the peptide with Gly residues presented both the highest surface coverage ($\Gamma = 2.6 \times 10^{-10}$ mol/cm^2) and electrochemical capacitance (C_μ = 270 μF/cm^2) values, it can be potentially applied for biosensors designing.