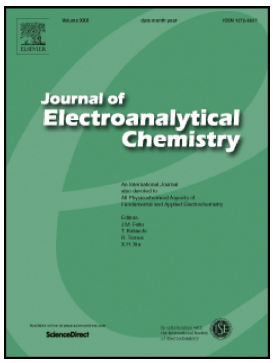

Covalently electrografted carboxyphenyl layers onto gold surface serving as a platform for the construction of an immunosensor for detection of methotrexate

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PII: S1572-6657(17)30953-0
DOI: https://doi.org/10.1016/j.jelechem.2017.12.072
Reference: JEAC 3777

To appear in: *Journal of Electroanalytical Chemistry*

Received date: 24 October 2017
Revised date: 23 December 2017
Accepted date: 29 December 2017

Please cite this article as: Sereilakhena Phal, Besart Shatri, Avni Berisha, Paul Geladi, Britta Lindholm-Sethson, Solomon Tesfalidet , Covalently electrografted carboxyphenyl layers onto gold surface serving as a platform for the construction of an immunosensor for detection of methotrexate. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Jeac(2017), https://doi.org/10.1016/j.jelechem.2017.12.072

Covalently electrografted carboxyphenyl layers onto gold surface serving as a platform for the construction of an immunosensor for detection of methotrexate.

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Abstract

The classical way to modify a gold electrode surface for immunosensor development is through self assembly of functionalised thiols for subsequent attachment of antibodies. Here is described a new pathway for surface modification using a diazonium salt-based immunosensor for detection of methotrexate (MTX) with electrochemical immittance spectroscopy (EIS). The diazonium salt, 4-carboxybenzenediazonium tetrafluoroborate was synthesized using a diazotization reaction and characterized by IR and cyclic voltammetry (CV). The Au electrode was electrografted with diazonium and used for anti-MTX antibody immobilization. The EIS detection of MTX was studied with and without application of redox probe; $Fe(CN)_6^{3-/4-}$. MTX could not be detected using $Fe(CN)_6^{3-/4-}$ as redox probe, whereas EIS measurements without redox probe and analysis of the data with singular decomposition (SVD) gave good results. A multivariate calibration model showed good linear behavior on a logarithmic scale with a detection limit for MTX of 7×10^{-12} mol L^{-1}.

Keywords: 4-carboxybenzenediazonium tetrafluoroborate, gold electrode, antibody, Immunosensor, singular value decomposition, cyclic voltammetry, Chronoamperometry, Electrochemical Impedance spectroscopy