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Carbon screen-printed electrode/Graphene-PEDOT:PSS/Prussian blue/PEDOT-AuNPs for electrochemical immunosensor application.

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Fast, reliable, inexpensive, and efficient pathogen detection for diagnostic purposes has always been a high priority in healthcare industry, leading to research for alternative diagnostic methods. An approach that is prominent and has all said characteristics is electrochemical-based immunosensors.

Recently, Graphene has gained a lot of interest in electricity-related fields due to its high electrical conductivity and other favorable properties, which could increase electrochemical response as well. The objective of this work is to develop graphene-based carbon screen-printed electrode for immunosensing.

Initially, Graphene-Poly(3,4-ethylenedioxythiophene) Polystyrene sulfonate (GR-PEDOT:PSS) was drop-coated on the surface of carbon screen-printed electrodes. Prussian blue nanoparticles were subsequently electrodeposited as the redox mediator. The electrodes may be drop-coated with GR-PEDOT:PSS and electrodeposited with Prussian blue again, creating different number of layers. Finally, gold nanoparticles (AuNPs) conjugated PEDOT polymer was drop-coated on the modified electrode to both promote electron transfer and act as base material for further protein immobilization via ionic bonding.

The materials utilized substantially enhanced electrochemical current response, indicating possible synergistic effects. Afterward, the modified electrodes were incubated with *Staphylococcal* Protein A and subsequently IgG antibodies.

The results obtained indicate successful deposition of both Protein A and IgG antibodies on the fabricated electrodes, which deemed this fabrication method promising for creating label-free point-of-care diagnostic immunosensors.

Author: Mr KWANYUEN, Zunpitch (Department of Biomedical Engineering, Chulalongkorn University)

Co-authors: Dr SEREEMASPUN, Amornpun (Faculty of Medicine, Chulalongkorn University); Dr PATARAKUL, Kanitha (Faculty of Medicine, Chulalongkorn University); Dr PRICHANONT, Seeroong (Department of Chemical Engineering, Chulalongkorn University)

Presenter: Mr KWANYUEN, Zunpitch (Department of Biomedical Engineering, Chulalongkorn University)

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