A Novel Rutin Electrochemical Sensor Using Reduced Graphene Oxide/Magnetite/Silver Nanoparticle-Molecularly Imprinted Polymer Composite Modified Electrode

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A novel rutin (RT) electrochemical sensor was fabricated by using reduced graphene oxide (rGO)/magnetite (Fe₃O₄)/silver nanoparticle (Ag)-molecularly imprinted polymer (MIP) composite to modify screen-printed electrode (SPE). The ternary composite of rGO/Fe₃O₄/Ag was prepared by the one-step solvothermal method. Subsequently, RT molecules were absorbed on the surface of rGO/Fe₃O₄/Ag due to the electrostatic force. Finally, the MIP was achieved by a polymerization reaction. The prepared composite was investigated by FTIR, XRD and VSM. The morphologies and electrochemical properties of different electrodes were characterized with FE-SEM, EIS, CV and DPV. Under the optimal conditions, the SPE | rGO/Fe₃O₄/Ag-MIP electrode exhibited highly sensitive and selective in determining of RT. The linear detection ranges (LDRs) were 1.0×10⁻² to 10.0 μM (*R*=0.9978) and 10.0 to 3.0×10³ μM (*R*=0.9965). The limit of detection (LOD) was as low as 4.2×10⁻³ μM (*S/N*=3). The proposed electrode was renewable, stable and reliable. It was used for determining RT in pharmaceutical samples with satisfactory results, confirming its promising application in routine RT analysis.

Keywords: Rutin; Reduced graphene oxide; Magnetite; Silver nanoparticles; Molecular imprinted polymer; Screen-printed electrode

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