

Green Synthesis of GQDs-Ag/Au Nanocomposites for Sensitive Electrochemical Detection of Ascorbic Acid, Dopamine and Hydrogen Peroxide



Theelada Panleam and Sirikanjana Thongmee*

Departments of Physics , Faculty of Science , Kasetsart University , Bangkok, Thailand

In the present investigation, gold (Ag-GQDs) and silver (Au-GQDs) nanocomposites were synthesized using a simple chemical process, whereas GQDs were synthesized using pyrolysis. A UV-vis spectrometer was used to investigate the optical characteristics of GQDs, Ag-GQDs, and Au-GQDs to determine the ideal concentration for the synthesis of AgNPs and AuNPs. X-ray diffraction (XRD), transmission electron microscopy (TEM), and scanning electron microscopy (SEM) were used to study the morphology, structure, and composition of the materials. Furthermore, the synthesized nanocomposites are fabricated on the glassy carbon (GC) electrodes surface by using a hexamethyl diamine (HDA) linker to examine their electrochemical characteristics. In comparison to the bare GC, GQDs modified GC (GC/GQDs), and Ag-GQDs modified GC (GC/Ag-GQDs) electrodes, the Au-GQDs modified GC electrode (GC/Au-GQDs) electrode demonstrated higher electrical conductivity and electroactive surface area. Furthermore, investigations were carried out on the electrocatalytic activity of GQDs and their nanocomposite modified electrodes towards the reduction of hydrogen peroxide (HP) and the oxidation of ascorbic acid (AA) and dopamine (DA). The GC/Au-GQDs modified electrode demonstrated greater electrocatalytic activity towards the reduction of HP and oxidation of AA and DA than GC/GQDs, GC/Ag-GQDs, and bare GC electrodes owing to its higher electroactive surface area and electrical conductivity.

Keywords graphene quantum dots, metal nanoparticles, cyclic voltammetry, impedance spectroscopy, electrochemical sensing

Biography:

Miss Theelada Panleam was born on February 1, 2002 in Phetchaburi, Thailand. She received her Bachelor's Degree in Science (Physics) from Kasetsart University in 2024. After graduation, She continued with graduate studies in the Faculty of Science (Physics) , Kasetsart University. And participating research Novel electrochemical platforms for the detection of both clinical disorder biomarker and environmental pollutants using graphitic carbon nitride-conducting oligomer composites.