Electroanalysis of Dopamine Using Polydopamine Functionalized Reduced Graphene Oxide-Gold Nanocomposite

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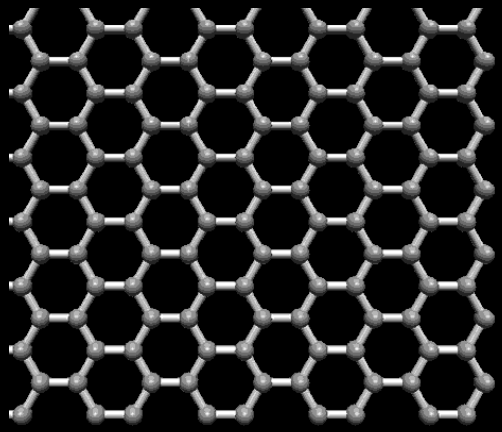
Introduction

Graphene

- Two-dimensional monolayer of graphite
- Extraordinary mechanical strength, large specific surface area and high conductivity
- Excellent platform for loading nanoparticles

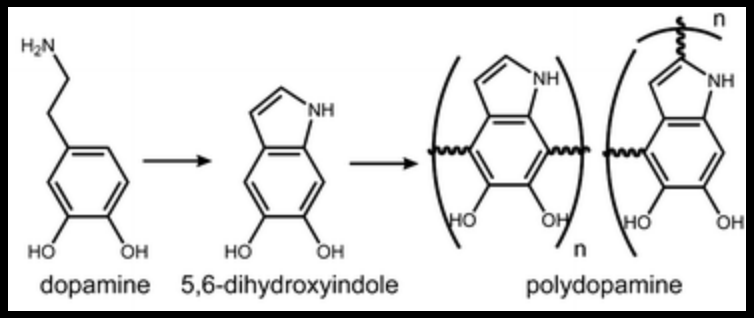


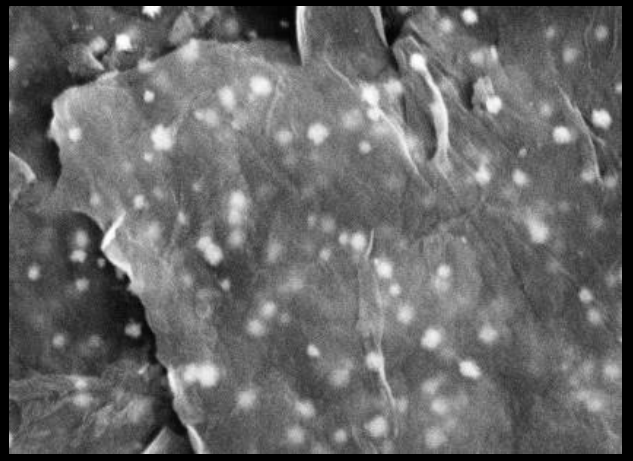
Introduction

Why Polydopamine and Gold ?

- Reduce agent for reduction of grapheme oxide
- Increase dispersity of reduced grapheme oxide

- Improved the electronic conductivity
- Increase surface area for electrocatalytic activity





Method

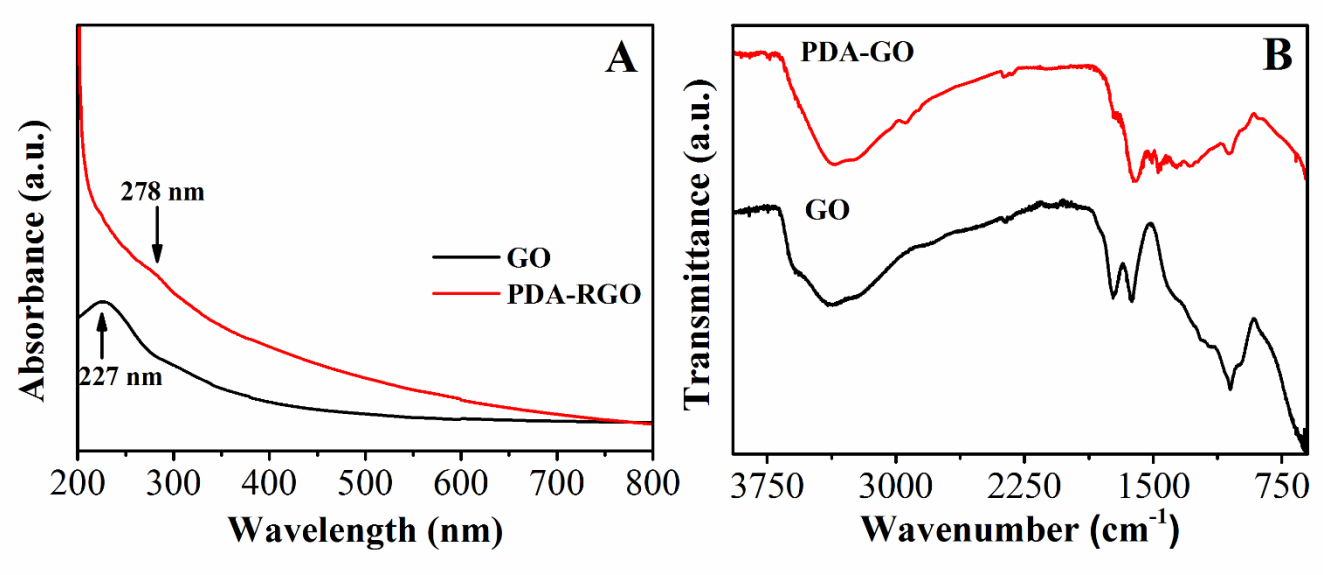
PDA-RGO nanocomposite:

Dopamine self-polymerization in Tris-buffer for 24 h

PDA-RGO/Au nanocomposite:

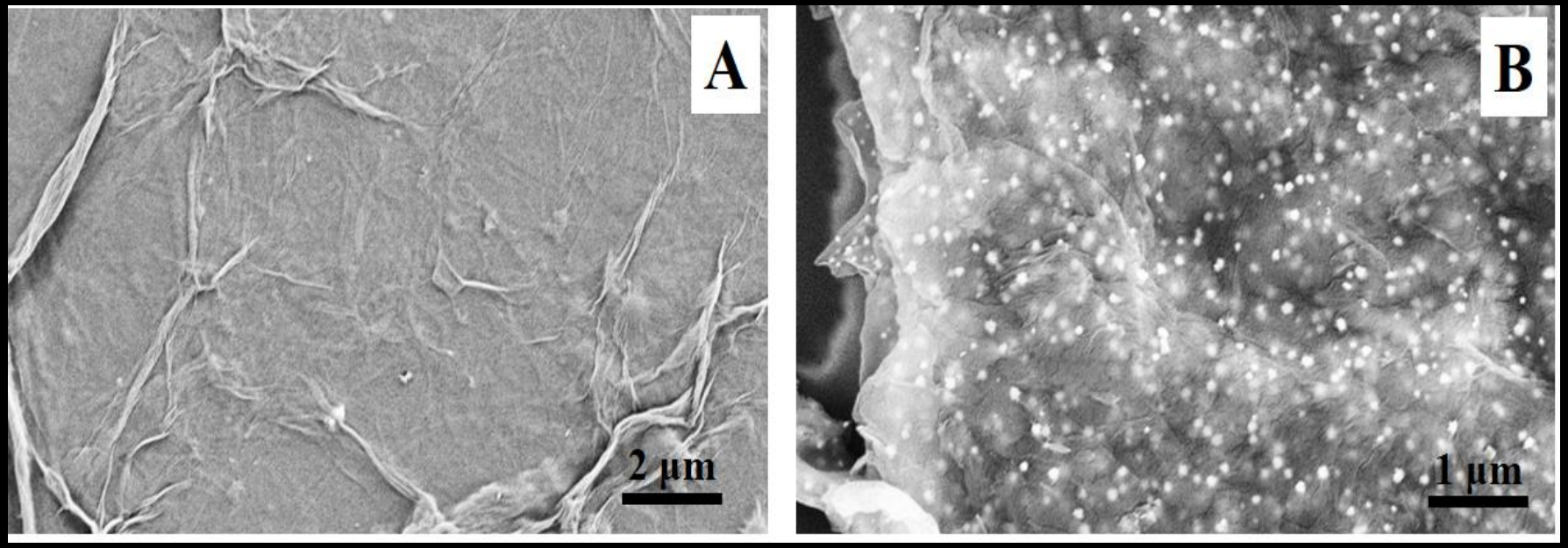
Electrodeposition

Characterizations

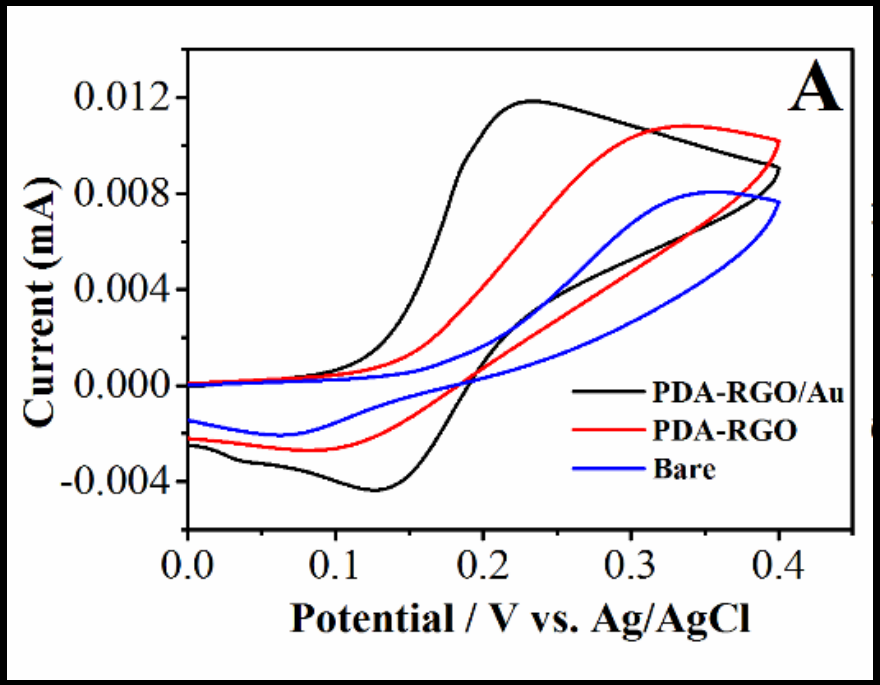


- FTIR spectra confirmed the successful functionalization of PDA
- FTIR also confirmed the reduction of GO
- UV-vis spectra confirmed the reduction of GO

Morphology

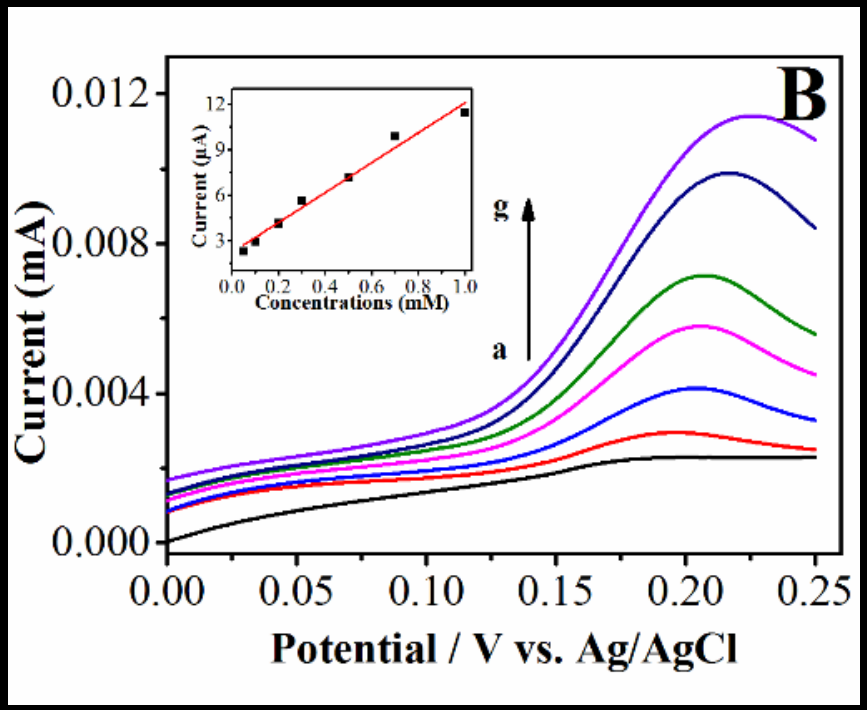


Electrochemical Behavior Towards Oxidation of DA



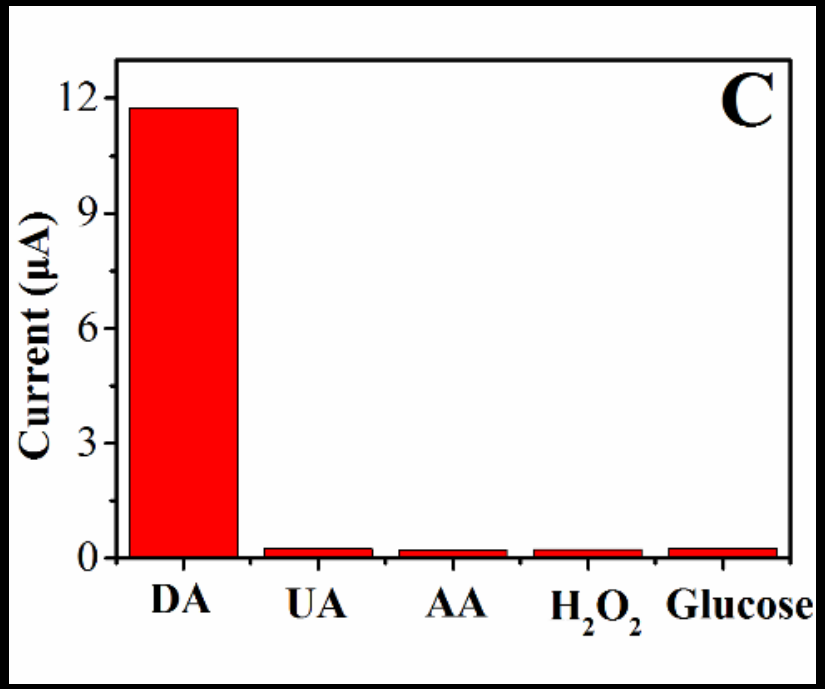
- PDA-RGO/Au modified electrode showed the best electrocatalytic performance towards oxidation of DA

Linear Sweep Voltammograms for DA Determination



- The oxidation peak currents showed a linear relationship with DA concentrations from 0.05-1 mM.
- Linear regression equation: as Ipa (μA) = 9.8684 c (mM) + 2.2215

Selectivity



- Excellent selectivity towards oxidation of DA

Summary

- PDA-RGO/Au nanocomposites were prepared via wet chemical method combined with electrodeposition
- FTIR and UV-vis spectroscopy confirmed the reduction of GO and PDA surface functionalization
- PDA-RGO/Au modified GCE exhibits an excellent electrocatalytic activity towards oxidation of DA.