

# Sensitive Electrochemical Sensor Based on Amino-Functionalized Graphene Oxide/Polypyrrole Composite for Detection of Pb<sup>2+</sup> Ions

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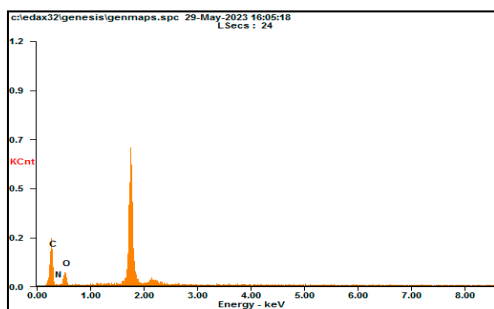
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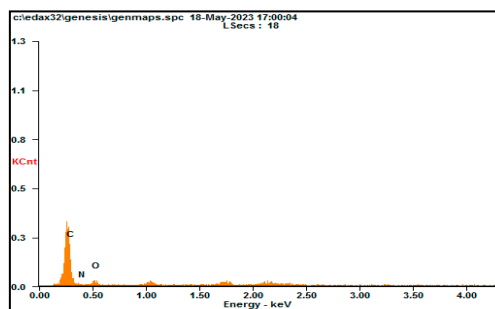
## Supplementary Material

### EDX Spectra

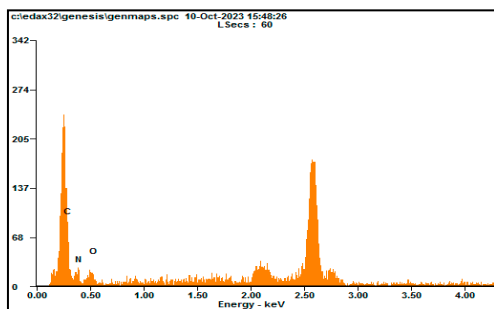
The EDX spectra for GO, AMGO, PPy, and the AMGO/PPy nanocomposite were examined, as depicted in Fig. 3 (a-d) of the main text. The analysis of the GO spectrum in Fig. S1a reveals the presence of C, N, and O elements, confirming GO synthesis. Similarly, in Fig.S1b, the EDX spectra of AMGO exhibit peaks corresponding to C, O, and N, confirming the successful incorporation of amine groups. The EDX analysis of PPy in Fig. S1c displays peaks indicative of C, O, and N, confirming the synthesis of PPy. Notably, the EDX spectra of the AMGO/PPy nanocomposite in Fig. S1d display a prominent C peak and peaks corresponding to N and O, providing conclusive evidence for the successful synthesis of the nanocomposite. This suggests the successful synthesis of the targeted materials. The elemental composition obtained from the EDX spectra is shown in Table S1.



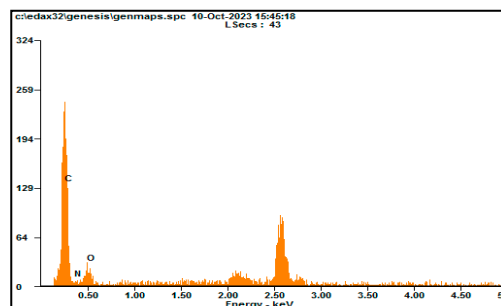
a)



b)



c)



d)

**Figure S1.** EDX spectra for GO (a), AMGO (b), PPy (c), and AMGO/PPy (d) nanocomposite.

**Table S1.** Elemental composition obtained from EDX spectra.

Materials	Weight percentage of elements (%)		
	C	N	O
GO	63.25	06.09	30.65
AMGO	74.07	13.32	12.61
PPy	61.25	27.11	11.65
AMGO/PPy	74.39	10.32	15.29

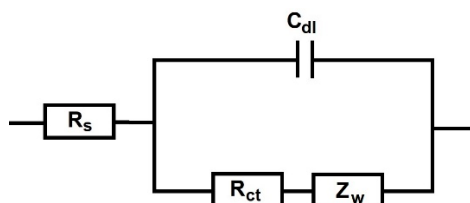
Table S2. displays four compositions, each blending distinct percentages of PPy with a 20 mg (100%) base of AMGO. Variations of 25%, 50%, 75%, and 100% PPy were introduced into the 20 mg AMGO matrix. Unique nomenclature, namely 5 PPyAG, 10 PPyAG, 15 PPyAG, and 20 PPyAG, was used for each composition. Changes in electrochemical composition can have a significant impact on the properties and behavior of substances. Changes in chemical composition can lead to variations in physical and chemical characteristics, such as changes in color, density, and reactivity.

**Table S2.** AMGO/PPy sample nomenclature.

Sr. no	PPy (mg)	AMGO (mg)	Nomenclature of sample
1	5	20	5 PPyAG
2	10	20	10 PPyAG
3	15	20	15 PPyAG
4	20	20	20 PPyAG

### Randles equivalent circuit

The Randles equivalent circuit used for the analysis of the EIS spectra is shown in Figure S2.



**Figure S2.** Randles equivalent circuit.  $C_{dl}$ —capacity of the double electric layer;  $R_s$ —resistance of the solution;  $R_{ct}$ —charge transfer resistance;  $Z_w$ —Warburg impedance.