Modification of carbon based sensors with rGO doped with metal nanoparticles

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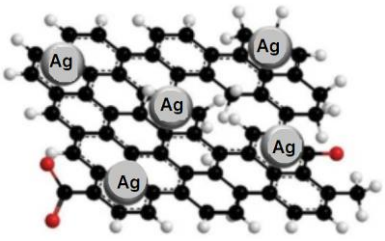
Abstract
Carbon nanomaterials are considered as potentially promising sensing materials for fabrication of high-performance electrochemical sensors for different applications [1]. However, it is highly required to investigate the structure effect of carbon supports on electrochemical sensing performances. In this work reduced graphene oxide (rGO) dopped with metal nanoparticles [2] are selected as modifier of carbon paste electrodes which were subsequently used to construct electrochemical sensors for three typical water pollutants: i)antibiotics; ii)pesticides, and iii)heavy metals. Characterization of modified carbon paste using characterization techniques [3] such as SEM, EDS, FTIR, XPS and TEM will explain that the presence of these modifiers (rGO/npMe), effect the morphology and microstructures of the electrode material and consequently the electrochemical response. It was observed that the presence of hybrid modifiers rGO/Me-np in the CPE improve analytical performance of the electrochemical sensors in terms of sensitivity and linear range. Consequently, CPE modified with these nanostructures (rGO/Me-np) can be used for development of high-performance sensors for interested analyts such as water pollutants. The aim of this work is to enhance the applications of carbon based hybrid structures as modifiers for the designing of new electrochemical nanosensors with wider applications.

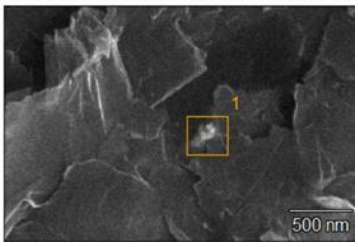
References

[1] A. Rhazouani, e al., Hindawi BioMed Research (2021) Article ID 5518999
[2] Ansari, A.R., et al., Materials (2021), 5032.
[3] S. Kumari, et al., ACS Omega (2020), 5, 5041−5047
[4] H. Wang, et al., Talanta, Volume 178, (2018), 188-194

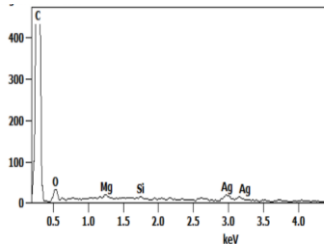
Figure: Reduced Graphene Oxide doped with Ag-np



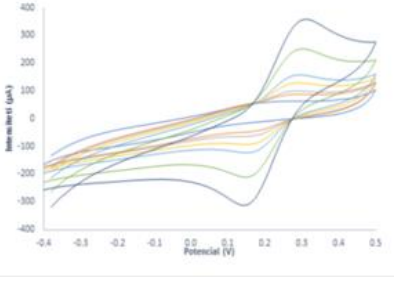
Schematic structure (●-C, ●-O, ●-H);



SEM of CPE-Ag@rGO composit



EDS of CPE-Ag@rGO composit



Electrochemical characterization: CV in the presence of redox couple Fe(+3)/Fe(+2)