The rGO@Me impact on modified pastes and printed sensors

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This work focuses on the development of sensors based on the carbon-based materials for environmental water pollution control. Here are present the results obtained during the implementation of SUSNANO twining Project.

Among the different types of carbon materials, we have focused on graphene derivatives as they have special physicochemical properties, high electrical conductivity, large theoretical specific surface area, fast rate of electron transfer, high flexibility which enable easy modification. The graphene is stable, inert and costly effective [1]. Further improvements in graphene properties are made by decoration of its structure using various functional groups. Nanomaterials of graphene decorated with metals (-rGO@Me), are used to develop modified carbon-paste electrodes. Also, rGO@Me printed sensors are prepared applying a new laser engraver technology. Synthetized nanomaterials are characterized using spectroscopic/microscopic (SEM, TEM, EDS and FT-IR) and electrochemical techniques.

Comparisons between rGO@Me modified CPE and rGO@Me printed sensor are done to highlight their performances. The incorporation of Me-np into the rGO structure enhances the sensor's performance compared to the unmodified CPE and printed rGO. Under optimal conditions, the analytical performance parameters of sensors are evaluated in terms of sensitivity, linear range and recovery test. The limit of detection of rGO@Me modified CPE resulted several ppm; while using the printed sensors (rGO@Me) the limit of detection is slighted improved.

This work highlights the opportunities that exist for further studies and innovations in the development of carbon-based sensors.

References

[1] Ahmed Kangmennaa, Richard Baffour Forkuo & Eric Selorm Agorku, Sensing Technology, VOL. 2, NO. 1, (2024).
[2] C. Giacomelli, R. Álvarez-Diduk, A. Testolin, A. Merkoçi, 2D Mater, (2020), 2053-1583
[3] A. Scroccarello, R. Álvarez-Diduk, F. Della Pelle, C. de Carvalho Castro e Silva, A. Idili, C. Parolo, D. Compagnone, A. Merkoçi *ACS Sens.* (2023), 598−609
[4] M.-A. Nalepa, D. Panáček, I. Dědek, P. Jakubec, V. Kupka, V. Hrubý, M. Petr, M. Otyepka, Biosensors and Bioelectronics. (2024), 256. 116277.