**Nanomaterials-modified screen-printed electrodes: a powerful platform for sensor and biosensor set-up.**R. Cancelliere 1, A. Di Tinno 1, L. Micheli 1

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Abstract

The use of nanomaterials in sensor and biosensor field is one of the hottest topics today in analytical chemistry. The advantage of using nanomaterials leads to sensors characterized by high sensitivity, stability, and an improved repeatability. [1]Screen-printed electrodes (SPEs) are recognized as successful sensors in modern electroanalytical chemistry due to their low background, wide potential window, cost-effectiveness, and easiness of surface modification. This last property allows modifying the screen-printed electrodes (SPEs) with several nanomaterials such as carbon nanotubes, graphene, nanoparticles, biochar, etc. [2]

In this work a comparative study using this devices (SPEs) modified by drop casting with different nanomaterials is reported. In particular, the modified SPEs have been morphologically and electrochemically characterized.

The research activity carried out for the development of sensors and biosensors based on SPE modified with nanomaterials will be presented. For instance, the sensor for uric acid detection based on SPE modified with cabon nanotubes, biosensors based on SPE modified with biochar for pollutants detection will be reported.



Fig.1: Schematic representation of a nanomaterial-modified SPE: a) by drop casting and then used to set up a biosensor, b) enzyme immobilization.

**References:**

[1] Bernalte, E., Marín-Sánchez, C., Pinilla-Gil, E., & Brett, C. M. A. (2013). Characterisation of screen-printed gold and gold nanoparticle-modified carbon sensors by electrochemical impedance spectroscopy. Journal of Electroanalytical Chemistry, 709, 70–76.

[2] Favero, G., Fusco, G., Mazzei, F., Tasca, F., & Antiochia, R. (2015). Electrochemical Characterization of Graphene and MWCNT Screen-Printed Electrodes Modified with AuNPs for Laccase Biosensor Development. Nanomaterials, 5(4), 1995–2006.

[3] Cinti, S., Arduini, F., Carbone, M., Sansone, L., Cacciotti, I., Moscone, D., & Palleschi, G. (2015). Screen-Printed Electrodes Modified with Carbon Nanomaterials: A Comparison among Carbon Black, Carbon Nanotubes and Graphene. Electroanalysis, 27(9), 2230–2238