

## **NAFION<sup>®</sup> STABILIZED SILVER NANOPARTICLES MODIFIED ELECTRODES: CHARACTERIZATION AND USE IN ELECTROANALYSIS**

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Spherical silver nanoparticles (10-30 nm) were synthesized modifying a published procedure<sup>1</sup>, and confirmed by TEM and UV-vis analysis. The Ag nanoparticles were used to modify Glassy Carbon (GC) Electrodes depositing onto the GC support a suspension of the nanomaterials in Nafion<sup>®</sup>.

Electrodes were morphologically characterized by Scanning Electron Microscopy (SEM) and Energy Dispersive X-ray Spectroscopy (EDS). Stability in air and in solution and repeatability were evaluated and their electrochemical properties, compared with those of bare glassy carbon and Nafion-modified glassy carbon electrodes, were studied with Cyclic Voltammetry (CV) and Electrochemical Impedance Spectroscopy (EIS) measurements, using [Ru(NH<sub>3</sub>)<sub>6</sub>]Cl<sub>3</sub> as model probe molecule.

The modified electrodes show promising electroanalytical performances with very high current densities, probably due to the increase of the effective surface area, to a formation of a random array of nanoparticles on the Nafion<sup>®</sup> three-dimensional substrate with intermediate diffusional behaviour between planar and convergent<sup>2-3</sup>, and to a very small double layer capacitance.

Applications exploiting the electrocatalytic properties of Ag for the detection of a model simple chlorinated compound (dichloromethane) and a more complex organic chlorinated compound (halothane) are presented.

### **References**

- [1] Z. Shervani, Y. Ikushima, M. Sato, H. Kawanami, Y. Hakuta, T. Yokoyama, T. Nagase, H. Kuneida, K. Aramaki, *Colloid Polym Sci*, (2008), 286, 403.
- [2] F.W. Campbell, R.G. Compton, *Anal Bioanal Chem*, (2010), 396, 241.
- [3] S.J. Xing, H. Xu, J.S. Chen, G.Y. Shi, L.T. Jin, *J Electroanal Chem*, (2011), 652, 60.