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SURFACE AND INTERFACES CHARACTERIZATION BY XPS OF THE LAYERED GC/Be/Pt ELECTRODE DEVELOPED AS ELECTROCHEMICAL SENSOR FOR BIOMOLECULES DETECTION

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In a previous communication [1] a novel procedure for preparing the composite electrode GC/Be/Pt, showing globular Pt meso-nanoparticles on the outer surface, was presented, based on two consecutive steps:

- as a first step, the betaine film is electrodeposited on GC by cyclic voltammetry (CV) or by pulse electrodeposition technique in a neutral solution containing Be 1,5 mM, giving the modified electrode, GC/Be
- the second one involves a 'controlled' electrodeposition of Na_2PtCl_6 2 mM onto GC/Be by voltammetric procedures, to achieve the finite GC/Be/Pt electrode

The effects of several experimental conditions, the strategic importance of betaine for a better modulation of platinum deposition and related surface morphologies, monitored by Scanning Electron Microscopy (SEM), were critically evaluated also in the light of literature data and properly considered for the use of GC/Be/Pt electrode as electrochemical sensor of important biomolecules such as B- group vitamins [1]

In this contribution based on XPS, the chemical analysis of the outer and intermediate surfaces of GC/Be/Pt electrode was sought to complete its characterization, by individuating the functional groups, responsible of physicochemical interactions, having significance either for interlayer assembly and for sensing biomolecules.

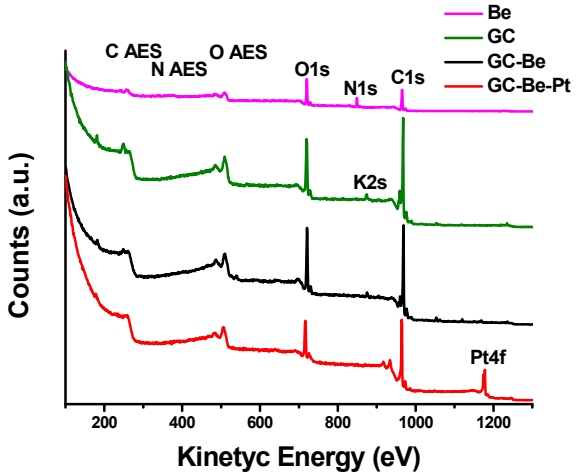

Figure 1. Labelled XPS wide spectra of powdered Betaine (Be) and Glassy Carbon (GC), GC/Be and GC/Be/Pt electrode surfaces

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XPS spectra were acquired with a SPECS Phoibos 100-MCD5 spectrometer, using achromatic MgKα radiation (1253.6 eV). The wide spectra labelling in Figure 1 indicates the elements composing each surface, whose detailed regions were to be acquired at higher resolution and be further resolved by curve-fitting using a well-established program, Googly [2]. The curve-fitted figures of each selected detailed region, have all been plotted with peak assignments (binding energies, BEs) and normalized areas [3], referenced to C1s aromatic carbon, as an internal standard, set at 284.6 eV, and to NIST XPS online database: http://www.nist.gov/srd/surface.htmtd.

These comparative XPS results seem to provide, from both qualitative and semi-quantitative point of view, important indications for the successful preparation of GC/Be/Pt electrodes and for understanding their performance as 'chemical sensors'.

References

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[2] Castle J.E., Chapman-Kpodo H., Proctor A., Salvi A.M., J. Electron Spectrosc. Relat. Phenom. 2000, 106, 65.

[3] D. Briggs, M.P. Seah, *Practical Surface Analysis*, second ed., Wiley, Chichester, 1990.