

# MWCNT scaffold films for total $\alpha_1$ - acid glycoprotein determination in serum samples

Tania Sierra<sup>1</sup>

Agustín G. Crevillén<sup>2</sup>, María Cristina González<sup>1</sup> and Alberto Escarpa<sup>1</sup>

<sup>1</sup> Department of Analytical Chemistry, Physical Chemistry and Chemical Engineering, University of Alcalá, Alcalá de Henares, Madrid, Spain

<sup>2</sup> Department of Analytical Sciences, UNED, Madrid, Spain

[tania.sierra@edu.uah.es](mailto:tania.sierra@edu.uah.es)

## Abstract

Alpha-1-acid glycoprotein (AGP) or Orosomucoid is a serum glycoprotein with a molecular weight between 41-43 KDa [1]. Total AGP content has been studied as serum biomarker for inflammatory bowel diseases [2]. In this sense, there is a need for developing fast and cheap analytical methods for diagnosis, prognosis and follow-up of these diseases.

We propose a simple and cheap electrochemical method for total AGP determination using disposable multiwalled carbon nanotube scaffold films (MWSFs).

The fabrication of these electrodes relies on the filtration of a homogeneous dispersion of the carbon nanomaterial on the Teflon filter which becomes the scaffold for the nanomaterial assembling without the need of any high external pressure, energy or growing chemistry. MWSFs present several distinct advantages when compared to traditional composites: casting or direct nanomaterial growing, straightforward and reproducible preparation, versatility, and exceptional conductivity at the micro and sub-micron levels [3].

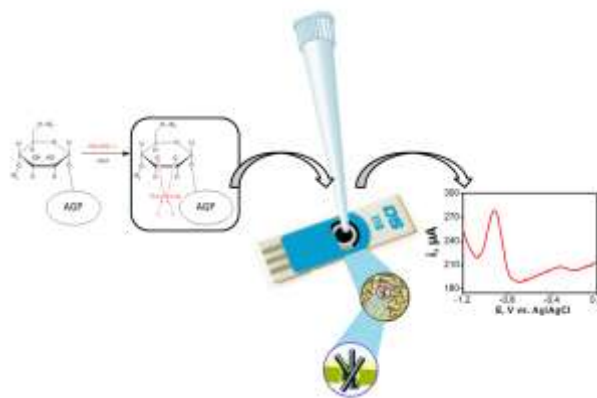
To achieve the electrochemical detection of AGP, the protein was labeled with an osmium (VI) complex (see Fig 1). Analytical performance of MWSFs electrodes were compared with commercial carbon screen printed electrodes (SPE). Lower limits of

detection and higher fouling resistance were displayed by MWSFs. Finally, the developed method was successfully applied to serum samples demonstrating that it could be useful in clinical diagnosis.

## References

- [1] T. Hocheplied, F.G. Berger, H. Baumann, C. Libert, *Cytokine & Growth Factor Reviews* 14 (2003)25-32
- [2] S. Vermeire, G. Van Assche, P. Rutgeerts, *Gut* 55 (2006) 426-431
- [3] A. Martin, L. Vazquez, A. Escarpa, *Journal of materials chemistry A* 4 (2016) 13142-12147

## Figures



**Figure 1:** Process to carry out the measurements of  $\alpha_1$ - acid glycoprotein using MWCNT scaffold films.