Desenvolvimento de método eletroquímico usando dispositivo analítico em papel para detecção de aminopirina em amostras de cocaína apreendidas

Development of electrochemical method using paper-based device for aminopyrine detection in seized cocaine samples

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This work shows an electrochemical method to quantify a cutting agent, *e.g.* aminopyrine, in seized cocaine samples. The importance to control cutting agents in cocaine samples is related to extract information to understand cocaine traffic dynamics and help in anti-trafficking police efforts [1]. For this purpose, we used an paper-based electrochemical cell with three electrodes system, where the auxiliary and reference electrodes were a graphite mine and Ag/AgCl electrode attached on the office paper surface, respectively, and a working electrode was fabricated on paper using a drop-casting procedure and a gold nanoparticles (AuNPs) suspension.

Briefly, the paper-based device was prepared on the surface of the office paper, where we made a wax frame using a wax printer (Color Qube 8570 Xerox) and after, it was heated in a heating plate (120ºC) in order to melt the wax and fill the three dimensional structured of paper matrix. Then, 1 µL of preconcentrated AuNPs suspension (78 µM) was dropped, in order to cover the wax delimited paper surface (0.72 mm of radius). In the last step of the device fabrication, it was exposed to an infrared lamp for sintering process. The deposited material showed a low resistivity value of 1.3 ± 0.5 Ω cm^{-1}(n = 17 devices).

The gold nanoparticle paper-based device exhibited an electrocatalytical effect for aminopyrine electro-oxidation when compared with a bare gold electrode, an anticipation of 155 mV (Figure 1). The quantification of aminopyrine was performed by differential pulse voltammetry technique in optimized conditions. A linear dependence of current signal with the analyte concentration was observed from 8 to 22 µM with an estimated limit of detection of 4,1 µM.

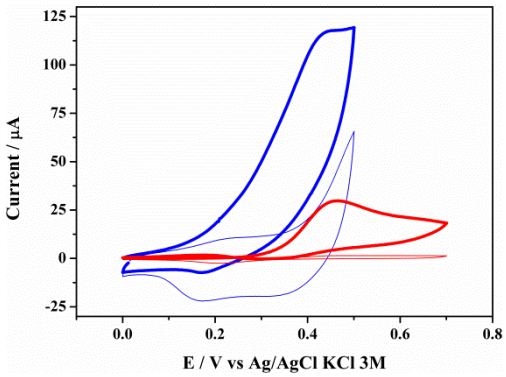

Figura 1 - Cyclic voltammograms recorded in 5 mM aminopyrine solution in PBS 0.1 M, pH = 12 using conventional gold electrode (red line) and paper-based electrode (blue line). The correspondents analytical signal recorded in blank solution were plotted in narrow lines. Both electrodes had same geometrical area (0.019 cm^{-2}). Scan rate of 50mV s^{-1}

Acknowledgments:
CNPq, FAPESP e CAPES

References:

[1] W. R. de Araujo, A. O. Maldaner, J. L. Costa, T.R.L.C. Paixão, *Microchemical Journal* 121 (2015) 213–218

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