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Plataforma sensorial de baixo custo e descartável para detecção de cobre (II) em amostras de suor: um método não invasivo

Inexpensive and disposable sensory platform for copper (II) detection in sweat samples: a non-invasive method

T. S. Martins [(1*)], P. A. Raymundo-Pereira [(2)], M. Calegaro [(1)] e S. A. S. Machado [(1)]

[1] Grupo de Materiais Eletroquímicos e Métodos Eletroanalíticos (GMEME), Instituto de Química de São Carlos (IQSC), Universidade de São Paulo (USP) – São Carlos – SP – Brasil
[2] Grupo de Polímeros, Instituto de Física de São Carlos (IFSC), Universidade de São Paulo (USP) – São Carlos – SP – Brasil

Abstract: The biomarkers detection in non-invasive samples using biological fluids are of great importance mainly to hemophobic people. Therefore, it is necessary to develop alternative methodologies that allow the detection and quantification of such species. The electrochemical sensors have emerged as a key technological option because they are low cost devices capable of detecting and quantifying a wide range of analytes with high stability and sensitivity. Printex Carbon (PC) has been shown to be a promising material to be used in the manufacture of electrodes because it presents excellent physical, chemical, electrochemical properties and low cost compared to others carbon nanomaterials commonly used as such as carbon nanotubes, graphene and fullerene[1]. Thus, the motivation of this work was the development of a sensory platform based on PC for the detection of copper ions in non-invasive samples: sweat. A suspension (1 mg mL^{-1}) of PC was prepared in dimethylformamide by ultrasonication for 2 h. Then 2 µL of the suspension was dropped onto the graphite pencil (diameter 2.0 mm). The electrochemical measurements were performed by adsorptive stripping differential pulse voltammetry (AdSDPV) in 0.1 mol L^{-1} acetate buffer solution in a potential range between of –0.8 and +0.4 V (vs. Ag / AgCl), an accumulation potential of −0.3 V *vs.* Ag/AgCl (3.0 mol L^{-1} KCl) for 300 s and a scan rate of 10 mV s^{-1}. Under these optimal experimental conditions, the voltammetric response was linearly dependent on the Cu(II) concentration in the range between 4.28×10^{-8} and 2.55×10^{-7} mol L^{-1} with a detection limit of 1.66×10^{-8} mol L^{-1}. The samples analyses were evaluated using the proposed sensor and a good recovery of Cu(II) was obtained with results in the range from 98.0% to 104%. The proposed method using the graphitrode/PC sensory platform was successfully applied for Cu(II) detection in artificial sweat samples.

References:
[1] P.A. Raymundo-Pereira, et al, Analytica Chimica Acta 926 (2016) 88-98.

* main author e-mail: thiagoserafimartins@gmail.com