ENHANCED ELECTROCHEMICAL DETECTION OF ANTI-INFLAMMATORY PHARMACEUTICALS FROM WATER USING ADVANCED VOLTAMMETRIC DETECTION METHODS

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Abstract

Pharmaceuticals and personal care products as pollutants (PPCPs) have been detected in the environment in the last decades. The major concerns with the ecotoxicities of PPCPs come from prescription and over-the-counter medications due to their specific targets on living tissues. In this study, the influence of the operating conditions of the voltammetric techniques, i.e., cyclic voltammetry (CV), differential-pulsed voltammetry (DPV) and square-wave voltammetry (SWV) on the electroanalytical performance of fullerene-carbon nanofiber paste electrode (F-CNF) for two anti-inflammatory, ibuprofen (IBP), and naproxen (NPX) determination is studied. From the cyclic voltammetry characterization, it can be seen that NPX oxidation occurred in two steps, starting with the potential value of +0.9V, followed by the oxidation at the potential value of 1.16V vs Ag/AgCl. The IBP oxidation occurred at more positive potential, at the potential value of +1.25V vs Ag/AgCl, informing about its difficulty to be oxidized. The optimization of the step potential (SP) and the modulation amplitude (MA) were achieved for DPV, which were further applied for SWV technique that exhibited fastest voltammetric response. The best performance in term of the lowest limit of detection (0.5 nM) was achieved for NPX determination using SWV technique at the potential value of +1.05V and, the lowest limit of detection (0.6 nM) was achieved for IBP using optimized DPV technique at potential value of +1.3V. This electrode has a great potential for practical utility in NPX and IBP determination in water at trace concentration levels.

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