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Square wave voltammetry sensing of ibuprofen on glassy carbon electrode

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Abstract : A glassy carbon was shown to enable the determination of ibuprofen using square wave voltammetry in aqueous alcoholic buffer of p H 1.0. The effect of pH was studied at different medium such as pH 1.0 to pH 13.0. The voltammetric detection of ibuprofen was carried out from −0.5 V to 1.8 V *versus* Ag/AgCl using glassy carbon electrode (GCE) as transducers. The oxidation peak around 1.6 V obtained for ibuprofen while employing electrode showed maximum current response. This peak was chosen for stripping analysis on GCE. The electroanalytical parameters of the biosensors are highly dependent on their configuration and on the dimensions of the carbon electrode. The best limit of detection obtained for ibuprofen was 200 ppb and the linear range from 300 to 800 ppb on GCE configuration. The ibuprofen was after adsorbed on electrode surface was characterized by atomic force microscopy. The adsorbed compound shows fine fiber like structure and good roughness values. The biosensors were successfully applied for the detection of ibuprofen in several drug formulations.
Keywords: ibuprofen, CyclicVoltammetry, Glassy Carbon Electrodes, AFM and Square Wave Voltammetry.

Introduction

Ibuprofen (IBP) is the third most popular drug in the world, non-prescription, non-steroidal drug used as an anti-inflammatory analgesic and antipyretic in the human treatment of fever, migraine, muscle aches, rheumatoid arthritis, tooth aches, and osteoarthritis[1,2]. This compound is a component of various pharmaceuticals, belonging to the most commonly used over-the-counter drugs. Average content of IBP in pharmaceuticals is 200-400 mg. IBP shows a strong analgesic and antipyretic action[3, 4]. The most recent epidemiological studies have indicated that chronic intake of ibuprofen is associated with lower risk of Alzheimer's disease (AD). This beneficial effect is attributed to the reduction of the inflammation response in brain in the AD and hence delays the cognitive decline[5, 6].

Last years, determinations and studies of IBP by electroanalytical methods have drawn attention due to their precision and simplicity[7-9]. Moreover, electroanalytical methods, especially voltammetry, are characterized also by high sensitivity, selectivity, low detection limit and reproducibility of the results, what is very important in identification and quantification of various components in pharmaceuticals[10,11]. Certain similarity in electrochemical and biological reactions which take place at the electrode and in the human body, makes electroanalytical methods very attractive and important tool in investigation of pharmaceuticals effect on