

Design of a novel nano sensor for acetaminophen determination by electrochemical polymerization of aniline-ortho aminophenol/Ni nano composite

A. Mohammadi¹, Q. Sadr Manuchehri^{2,*}, A. Naeemy², N. Assi²

¹Department of Drug and Food Control, Faculty of Pharmacy, Tehran University of Medical Sciences, Tehran, Iran

²Nanotechnology Research Centre, Faculty of Pharmacy, Tehran University of Medical Sciences, Tehran, Iran

Background and Aims: The present study introduces a novel modified electrode based on incorporation Nickel in Poly(aniline-co-o-aminophenol) (PAN-OAP) film. Poly (PAN-OAP) has been synthesized by electrochemical copolymerization of aniline (AN) and o-aminophenol (OAP) on graphite electrode (GE). The prepared modified electrode (Ni/ Poly (PAN-OAP)/GE) was used for electrocatalytic oxidation of acetaminophen and its determination in pharmaceutical tablets.

Methods: Copolymer films were prepared by Consecutive cycling with cyclic voltammetry technique, which is following to the incorporation of Ni (II) into copolymeric layer by immersion of modified electrode in nickel solution. The electrocatalytic oxidation and the assay of acetaminophen were studied by cyclic voltammetry and chronoamperometry methods.

Results: The effects of scan rate and acetaminophen concentration on the electrocatalytic oxidation of acetaminophen were investigated at the surface of Ni/ Poly (PAN-OAP)/GE. With respect to Ni/ POAP/GE, Ni/ Poly (PAN-OAP)/GE shows a higher catalytic performance for the electrocatalytic oxidation of acetaminophen. The oxidation of acetaminophen occurs at a potential where the oxidizing Ni (III) species are generated. Finally, the catalytic rate constants for acetaminophen were estimated using the chronoamperometric method.

Conclusions: This research in finding a cheap and efficient catalyst for electrooxidation of acetaminophen give us an attempt to make and examine the behavior of poly(aniline-co-o-aminophenol)/nickel modified graphite electrode Ni/ Poly (PAN-OAP)/GE in absence and presence of acetaminophen. The relatively high sensitivity of the modified electrode toward the analyte species suggests its potential utility as a detecting device in flow analysis.

Keywords: Nano sensor, Electrochemical polymerization, Acetaminophen