ABSTRACT

Zinc Oxide nanoparticles-modified carbon paste electrode used for the electrochemical determination of Gallic acid.

Chrys. Chikere¹, Paul Kong Thoo-Lin¹, Nadimul Faisal² and Carlos Fernandez

¹. School Pharmacy and Life Science
². School of Engineering

Robert Gordon University, Aberdeen, AB10 7GJ

Introduction

There is strong evidence suggesting that free radicals and malfunctioning antioxidants in humans have been linked to many diseases such as cardiovascular diseases, cancer and Alzheimer. Hence the determination and assessment of antioxidant capacity in the food and human health industry, has been widely investigated. Currently, the analytical techniques used to study antioxidant capacity include ultraviolet/visible, fluorescence spectrophotometry and chromatography. However, there has been intense research interest to replace the latter techniques by other technologies, because of some of the drawbacks which includes cost of equipment, sample preparation time, sample colour interferences and sensitivity. One of such technology is electrochemical biosensors, which have the advantages of being fast, sensitive, inexpensive, portable with little or no sample pre-treatment and they could be amenable to miniaturization. Although electrode modifications have been reported to have improved sensitivity for the determination of the antioxidant capacity of samples, however, the selectivity of these electrodes towards antioxidants remains to be addressed.
**Method**

A simple and fast electrochemical method was developed for the determination of Gallic acid based on the physical properties of synthesised Zinc Oxide nanoparticles and carbon paste electrodes. Carbon paste electrode was modified using synthesised Zinc Oxide nanoparticles; and the electrode was used for the determination of Gallic acid.

**Results**

The cyclic voltammetric results showed that the Zinc oxide modified carbon paste electrode exhibited an efficient oxidation of Gallic acid that hugely enhanced the response signal with about 150μA difference.

The bare carbon paste electrode produced peak current of about 250μA for the oxidation of GA, while the modified electrode produced a peak current of 410μA.

**Discussion**

The electrochemical activity or behaviour of Gallic acid on the Zinc Oxide nanoparticles-modified carbon paste electrode was studied using differential pulse voltammetry, this showed the electrode was sensitive to Gallic acid at a relatively low LOD. The proposed method was successfully used for the determination of GA in red wine and white wine, with recoveries of 101.58% and 103.45% respectively.