Development of melamine sensor based on ionic liquid/nanoparticles/chitosan with modified gold electrode for determination of melamine in milk product

Abstract

The illegal adulteration of infant milk powder with melamine in China has resulted in chronic kidney and urinary tract failure in September 2008. To date, several analytical techniques have been used for the determination of melamine, although these techniques are complicated, time consuming and costly. In this study, we developed a novel electrochemical biosensor method based on the modification of gold electrode with chitosan, calcium oxide nanoparticles and an ionic liquid for the determination in the presence of melamine in milk products. The electrochemical behaviour of the modified gold electrode was studied by using cyclic voltammetry and differential pulse voltammetry in the presence of methylene blue used as a redox indicator. The morphological characteristics of nanomaterials were observed under scanning electron microscope. Under optimal conditions, differential pulse voltammetry was detected at different concentrations of melamine from $9.6 \times 10-15$ M, with a detection limit of $9.6 \times 10-16$ M. The developed melamine sensor method is a very simple and fast procedure for analysing melamine level in milk and milk products. © 2015.