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Peroxidase biosensor based on carbon electrode modified by magnetic particles

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A peroxidase biosensor is highly demanded in food, healthcare, pharmaceutical and environmental analysis. H_2O_2 is often a residue component of non-food product. Moreover, H_2O_2 is used as an antibacterial agent added to milk or it is used for sterilization of equipment related to food and beverage during the both technological manufacturing and packaging. European union countries contain of H_2O_2 higher than 0.1% which is not allowed in these products. If the level of H_2O_2 exceeds 6%, health damage or at least skin irritation can be expected. Due to toxicity of H_2O_2 in higher concentrations sensitive method for its detection is required. In this work, a voltammetric biosensor based on horseradish peroxidase, magnetic particles and Prussian blue entrapped in chitosan membrane onto carbon working electrode was proposed as a suitable tool for the assay purposes. Magnetic particles contained pseudo-peroxidase activity catalyzed reduction of H_2O_2 and Prussian blue enabled highly sensitive detection at low potential. Square wave voltammetry was used as detection method. Concentration curve replies Michaelis equation with correlation coefficient 0.999 and limit of detection was set to be 0.03% of H_2O_2. Uric acid, ascorbic acid, trolox, acetaminophen and reduced glutathione were measured as interferents and no significant influence on measured method was observed when presented in equivalent concentrations like the H_2O_2. No effect of matrix (tooth paste, hand cream and skin tonic) assay was detected. On the basis of gained results, method was considered as highly sensitive, accurate and fast assay for detection of H_2O_2.

Biography

Pavla Martinkova has completed her MSc at Faculty of Pharmacy, Charles University in Prague, Czech Republic. She has been the PhD student in field of Toxicology at the University of Defense, Faculty of Military Health Sciences, Czech Republic since 2014. She has been working on "The development and innovation of analytical methods and biosensors for poisoning diagnosis".

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