International Conference & Exihibition on
Analytical and Bioanalytical Techniques 2010
ANANBIOANAL - 2010
Pharmaceutical R & D Summit
doi:10.4172/2155-9872.1000083

Application of Enzyme Immobilized Nanostructured Fe doped TiO_2 for Electrochemical Quantification of Urea

Ravi Ranjan Pandey[1], Krishan Kumar Saini[2], Marshal Dhayal[1]

[1]Centre for Cellular and Molecular Biology, Uppal Road, Hyderabad, India
[2]National Physical Laboratory, Dr K S Krishnan Marg, New Delhi, India

Electrochemical enzymatic biosensors detect their targets based on enzymatic catalysis of a reaction that produces or consumes electrons. Electron communication between the enzymes and the electrode is a major barrier in the development of electrochemical enzymatic sensors. One of the reasons for this is that the active redox centers of enzymes are deeply embedded in an electrically insulate protein shell. In order to address this problem, we have utilized Fe doped metal oxide (TiO_2) films as the shuttles to transport electrons between the electrode and the redox centers of enzymes. An electrochemical biosensor was fabricated for the quantitative determination of urea in aqueous medium using PBS, at pH-7.2. The urease (Urs) was immobilized onto an electrode made of Fe doped TiO_2 films onto an indium-tin oxide (ITO) coated glass substrate using sol-gel technique. The linkage between the Urs enzyme and Fe doped TiO_2 films provided the resulting enzyme electrode (Urs/Fe-TiO_2/ITO) with a high level of enzyme immobilization and excellent lifetime stability. The response studies were carried out as a function of urea concentration with amperometric measurements. The biosensor based on Urs/Fe-TiO_2/ITO as the working electrode showed an enhanced sensitivity of urea, indicating the Urs enzyme immobilized on the electrode surface had a high affinity to urea.