FERROCENE CORED PAMAM TYPE DENDRIMERS: AN ARTIFICIAL REDOX PROTEINS AND ITS APPLICATION TO REAGENTLESS GLUCOSE BIOSensor

Mehmet Senel¹, Cevdet Nergiz¹, Emre Çevik², M. Fatih Abasıyanık²

¹ Fatih University, Faculty of Arts and Sciences, Chem. Dept., 34500 İstanbul, Turkey  
E-mail: msenel@fatih.edu.tr; cnergiz@fatih.edu.tr

² Fatih University, Faculty of Engineering, Genetics and Bioengineering, Dept., 34500 İstanbul, Turkey  
E-mail: ecevik@fatih.edu.tr; mfatih@fatih.edu.tr

In the field of amperometric biosensors, much effort is currently being aimed at the immobilization of redox mediators that shuttle electrons between the enzyme's redox centers and the electrode [1, 2]. Ferrocene has been one of the most successful redox mediators due to its well-behaved electrochemical properties. For this reason, a variety of immobilization procedures for ferrocene species have been developed to fabricate reagentless amperometric biosensors. In electrochemical experiments, the interfacial orientation of the protein near the electrode surface influences the effective rates of the heterogeneous electron transfer reaction [3].

In this study, a novel amperometric glucose biosensor was developed by incorporation of series of dendrimers containing single ferrocene subunit appended to a dendrimers-type branch of variable size into modified enzyme electrodes. The glucose biosensor was fabricated by modification of gold electrode with thiopropionic acid, ferrocene-PAMAM dendrimers and enzyme, respectively. Amperometric response was measured as a function of concentration of glucose at a fixed potential. The effects of generation of the ferrocene dendrimers with and without GOx were investigated, and the pH-activity profiles of immobilized GOx were examined. The storage and operational stabilities of the sensors were established, and the influence of the interferents on the amperometric signals of the sensors was determined.

References