**Heme-protein Modified Electrodes for Highly Selective and Sensitive Detection of H2O2 from Apple Juice**

The development of an accurate, sensitive, and selective hydrogen peroxide (H2O2) diagnostic device with a low detection limit is important in the fields of biology and medicine. Numerous approaches have been reported for electrochemical detection of H2O2. These approaches exhibit good stability and selectivity with a low detection limit, but involve a complicated fabrication process. We designed and fabricated three enzyme-free H2O2 biosensors by coating a three-dimensional open-pore nickel foam (3D-Ni foam) electrode with heme proteins, namely, (hemoglobin (Hb), myoglobin (Mb), and cytochrome c (Cyt.c)). The heme protein modified Ni foam can be directly used as electrodes, thereby simplifying the electrode fabrication pr o-cess and offering advantages, such as enhanced electrode–electrolyte contact area and minimum diffusion resistance. Heme proteins can function as a redox mediator for shuttling electrons on the electrode– electrolyte interface and for engaging sufficient electro-active species exposed on the surface of the Ni foam for the Faradaic redox reaction. The immobilization of the heme proteins onto the 3D Ni foam was analyzed using scanning electron microscopy, UV-visible spectroscopy, contact angle, and Raman spectroscopy. The heme proteins maintained their biological functions and effective electronic connection and affected the interfacial properties of the Ni foam after immobilization. The electrochemical effects of the Ni foam electrodes modified with similar concentrations of different heme proteins (Hb, Mb, and Cyt.c) in the selective oxidation of H2O2 were investigated and compared. Hence, these electrodes can be applied in the analysis of real samples, such as apple juice.