

Ferricyanide-intercalated flavoenzyme-modified pseudocapacitive electrode

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Basically, an enzyme belonging to the proteins which is one of biomacromolecules is electrically non-conductive, and can be used as an insulating material for capacitors. In this work, we fabricate a ferricyanide-intercalated flavoenzyme-based pseudocapacitor which acts as an electric double-layer capacitor and simultaneously as the pseudocapacitor. Cyclic voltammetric intercalation of flavoenzymes with ferricyanide activates pseudocapacitive property of the enzyme-modified pseudocapacitive electrode. Indium tin oxide was employed as the substrate to immobilize methyl tryptophan oxidase (MTO) via amino-glutaraldehyde cross-linking chemistry. The ferricyanide-intercalated MTO-based pseudocapacitor is characterized by the cyclic voltammetry, electrochemical impedance spectroscopy, atomic force microscopy, and Fourier-transformed infrared spectroscopy. Charging and discharging characteristics and long-term stability of the pseudocapacitor are also presented.