David W Schmidtke, J Bioengineer & Biomedical Sci 2017, 7:4 (Suppl)
DOI: 10.4172/2155-9538-C1-016

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Novel redox polymer films for biosensing and biofuel cell applications

Molecular wiring of the redox centers of enzymes to electrode surfaces via redox polymers has attracted considerable attention due to its use in developing biosensors for metabolic monitoring of glucose in diabetes, detection of hybridization reactions in RNA and DNA assays, antigen-antibody binding in immunoassays, and in miniaturize biofuel cells. However for these devices to be useful their sensitivity and lifetime must be sufficient for them to be operated by portable low-cost electronics. This talk will describe our research on the design of a new class of redox polymers based on attaching ferrocene (Fc) redox centers to linear polyethyleneimine (LPEI). We will provide an overview of how the polymer and redox center structure affects their stability, redox potential, and ability to electrically communicate with enzyme redox centers? We will discuss, how these novel redox polymers can electrically communicate with the redox centers of a variety of enzymes (e.g. glucose oxidase, horseradish peroxidase, fructose dehydrogenase) and generate bioelectrocatalytic current densities >1 mA/cm^2? Finally, we will discuss how these redox polymers can be combined with the unique properties of Single-Walled Carbon Nanotubes (SWNTs) for both biosensing and enzymatic biofuel cell applications?.

Biography

David W Schmidtke is a Professor of Bioengineering at the University of Texas at Dallas (UT-Dallas). He has received his PhD in Chemical Engineering from the University of Texas at Austin and completed his Postdoctoral studies in the Institute of Medicine and Engineering at the University of Pennsylvania. Prior to joining UT-Dallas, he was a Professor of Chemical Engineering at the University of Oklahoma, and served as the Director of the University of Oklahoma Bioengineering Center. He has been a recipient of both an American Heart Association Scientist Development Award and a National Science Foundation CAREER Award.

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