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Autore	Alkire Richard C
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1.3 Defining a Standard for Characterizing Biosensor Performances1.4 Success Stories in Biosensor Research; 1.4.1 Direct ET Employed for Biosensors and Biofuel Cells; 1.4.2 Direct ET with Glucose Oxidase; 1.4.3 Mediated ET Employed for Biosensors and Biofuel Cells; 1.4.4 Nanomaterials and Biosensors; 1.4.4.1 Modification of Macroscopic Transducers with Nanomaterials; 1.4.4.2 Nanometric Transducers; 1.4.4.3 Modification of Biomolecules with Nanomaterials; 1.4.5 Implanted Biosensors for Medical Research and Health Check Applications
1.4.6 Nucleic Acid-Based Biosensors: Nucleic Acid Chips, Arrays, and Microarrays1.4.7 Immunosensors; 1.4.7.1 Labeled Approaches; 1.4.7.2 Nonlabeled Approaches; 1.5 Conclusion; Acknowledgments; Abbreviations; Glossary; References; 2: Imaging of Single Biomolecules by Scanning Tunneling Microscopy; 2.1 Introduction; 2.2 Interfacial Electron Transfer in Molecular and Protein Film Voltammetry; 2.2.1 Theoretical Notions of Interfacial Chemical and Bioelectrochemical Electron Transfer; 2.2.2 Nuclear Reorganization Free Energy
2.2.3 Electronic Tunneling Factor in Long-Range Interfacial (Bio) electrochemical Electron Transfer2.3 Theoretical Notions in Bioelectrochemistry towards the Single-Molecule Level; 2.3.1 Biomolecules in Nanoscale Electrochemical Environment; 2.3.2 Theoretical Frameworks and Interfacial Electron Transfer Phenomena; 2.3.2.1 Redox (Bio)molecules in Electrochemical STM and Other Nanogap Configurations; 2.3.2.2 New Interfacial (Bio)electrochemical Electron Transfer Phenomena
2.4 In Situ Imaging of Bio-related Molecules and Linker Molecules for Protein Voltammetry with Single-Molecule and Sub-molecular Resolution2.4.1 Imaging of Nucleobases and Electronic Conductivity of Short Oligonucleotides; 2.4.2 Functionalized Alkanethiols and the Amino Acids Cysteine and Homocysteine; 2.4.2.1 Functionalized Alkanethiols as Linkers in Metalloprotein Film Voltammetry; 2.4.2.2 In Situ STM of Cysteine and Homocysteine; 2.4.2.3 Theoretical Computations and STM Image Simulations; 2.4.3 Single-Molecule Imaging of Bio-related Small Redox Molecules
2.5 Imaging of Intermediate-Size Biological Structures: Lipid Membranes and Insulin

Sommario/riassunto

Bioelectrochemistry is a fast growing field at the interface between electrochemistry and other sciences such as biochemistry, analytical chemistry and medicinal chemistry. In the recent years, the methods and the understanding of the fundamentals have seen significant progress, which has led to rapid development in the field.Here, the expert editors have carefully selected contributions to best reflect the latest developments in this hot and rapidly growing interdisciplinary topic. The resulting excellent and timely overview of this multifaceted field covers recent methodological adva