

Electrochemical Biosensors: Electrode Development, Materials, Design, and Fabrication

Hayder A. Abdulbari^{1,}, Esmail A. M. Basheer¹*

Center of Excellence for Advanced Research in Fluid Flow, Faculty of Chemical and Natural Resources Engineering, Universiti Malaysia Pahang, 26300 Kuantan, Pahang, Malaysia.

ABSTRACT

This paper reviews the engineering design of an electrochemical biosensor, particularly the main concepts of electrodes and the type of material selections, design, and fabrication method. Furthermore, the related theories and practical examples from existing literature are reviewed. Research is now directed toward the development of biosensors as important bioanalytical tools in the pharmaceutical, biotechnology, food, and other consumer oriented industries. Currently, comprehensive guidelines on the selection of electrodes for electrochemical biosensors are unavailable. Factual options are important in determining the real-time response of biosensors. Attempts to determine the best material and design for electrodes have no results because of the complexity of fabrication and the lifespan of the material chosen for the electrodes. This paper summarizes the trends in numerous studies on developing electrochemical biosensors. A better understanding of biosensors will greatly assist in the design of new and improved biosensors.

KEYWORDS: Biosensor, Design, Electrochemistry, Electrodes, Fabrication.

DOI: <https://doi.org/10.1002/cben.201600009>

ACKNOWLEDGMENTS

This research was supported by the Universiti Malaysia Pahang. We thank our colleagues from Universiti Malaysia Pahang who provided insight and expertise that greatly assisted the research, although they may not agree with all of the conclusions of this paper.