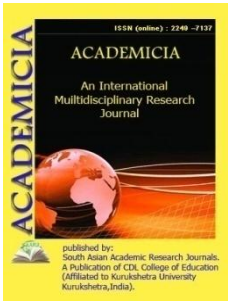
ACADEMICIA

ISSN: 2249-7137 Vol. 11, Issue 10, October 2021 Impact Factor: SJIF 2021 = 7.492

ACADEMICIA
An International Multidisciplinary Research Journal
(Double Blind Refereed & Peer Reviewed Journal)



DOI: 10.5958/2249-7137.2021.02114.5

A REVIEW ON BIOSENSORS AND RECENT DEVELOPMENT

Dr. Shiva Sharma*; Dr. Sudheesh Shukla; Dr. Manisha Rastogi*****

[1, 2, 3]School of Biomedical Engineering,
Faculty of Engineering and Technology,
Shobhit Institute of Engineering and Technology,
(Deemed to be University), Meerut, INDIA
Email id: [1]shiva@shobhituniversity.ac.in, [2]sudheesh.shukla@shobhituniversity.ac.in
[3]Manisha.rastogi@shobhituniversity.ac.in

ABSTRACT

A biosensor is a device that combines a receptor and a transducer to transform a biological reaction into an electrical signal. Because of the broad variety of biosensor applications, such as health care and illness diagnostics, environmental monitoring, water and food quality monitoring, and medication delivery, the design and development of biosensors has taken center stage for researchers and scientists in the last decade. The main challenges in biosensor development are I efficient biorecognition signal capture and transformation into electrochemical, electrical, optical, gravimetric, or acoustic signals (transduction process), and (ii) improving transducer performance (i.e., increasing sensitivity, shorter response time, reproducibility, and low detection limits even to detect biorecognition signals). These problems may be solved by combining sensing technologies with nanomaterials that vary in size from zero to three dimensional, have a high surface-to-volume ratio, excellent conductivities, shock-bearing properties, and color tunability. Nanoparticles (NPs) (high stability and carrier capacity), nanowires (NWs) and nanorods (NRs) (high detection sensitivity), carbon nanotubes (CNTs) (large surface area, high electrical and thermal conductivity), and quantum dots (QDs) are some of the nanomaterials (NMs) used in the fabrication of nanobiosensors (color tunability). Furthermore, these nanomaterials may function as transduction elements in and of themselves. This review summarizes the evolution of biosensors, the different types of biosensors based on their receptors and transducers, and modern biosensor approaches that use nanomaterials such as NPs (e.g., noble metal NPs and metal oxide NPs), NWs, NRs, CNTs, QDs,

and dendrimers, as well as their recent advancement in biosensing technology with the expansion.

KEYWORDS: *Biosensors, Carbon Nanotubes, Gold Nanoparticles, Nanomaterials, Nanobiosensing.*

REFERENCES

1. P. Mehrotra, "Biosensors and their applications - A review," *Journal of Oral Biology and Craniofacial Research*. 2016, doi: 10.1016/j.jobcr.2015.12.002.

2. N. Bhalla, P. Jolly, N. Formisano, and P. Estrela, "Introduction to biosensors," *Essays Biochem.*, 2016, doi: 10.1042/EBC20150001.

3. H. A. Alhadrami, "Biosensors: Classifications, medical applications, and future prospective," *Biotechnology and Applied Biochemistry*. 2018, doi: 10.1002/bab.1621.

4. R. Monošík, M. Streďanský, and E. Šturdík, "Biosensors - classification, characterization and new trends," *Acta Chim. Slovaca*, 2012, doi: 10.2478/v10188-012-0017-z.

5. H. Kaur, A. Bhosale, and S. Shrivastav, "Biosensors: Classification, Fundamental Characterization and New Trends: A Review," *Int. J. Heal. Sci. Res.*, 2018.

6. S. N. Botewad, D. K. Gaikwad, N. B. Girhe, H. N. Thorat, and P. P. Pawar, "Urea biosensors: A comprehensive review," *Biotechnology and Applied Biochemistry*. 2021, doi: 10.1002/bab.2168.

7. F. Yang, Y. Ma, S. G. Stanciu, and A. Wu, "Transduction Process-Based Classification of Biosensors," in *Nanobiosensors*, 2020.

8. R. Mahr, C. Gätgens, J. Gätgens, T. Polen, J. Kalinowski, and J. Frunzke, "Biosensor-driven adaptive laboratory evolution of l-valine production in Corynebacterium glutamicum," *Metab. Eng.*, 2015, doi: 10.1016/j.ymben.2015.09.017.

9. Y. Liu, Y. Zhuang, D. Ding, Y. Xu, J. Sun, and D. Zhang, "Biosensor-Based Evolution and Elucidation of a Biosynthetic Pathway in Escherichia coli," *ACS Synth. Biol.*, 2017, doi: 10.1021/acssynbio.6b00328.

10. W. Zhang, Y. Du, and M. L. Wang, "Noninvasive glucose monitoring using saliva nano-biosensor," *Sens. Bio-Sensing Res.*, 2015, doi: 10.1016/j.sbsr.2015.02.002.

11. Y. J. Teh, A. Bahari Jambek, and U. Hashim, "A study of nano-biosensors and their output amplitude analysis algorithms," *Journal of Medical Engineering and Technology*. 2017, doi: 10.1080/03091902.2016.1223195.