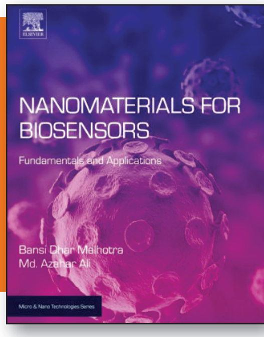


Nanomaterials for Biosensors: Fundamentals and Applications

Bansi Dhar Malhotra and Md. Azahar Ali

Elsevier, 2017
332 pages, $135.00 (e-book $135.00)
ISBN 9780323449236

The subject of nanomaterials for biosensors is generally of great interest to undergraduate and graduate students in chemistry, physics, materials science, and biomedical science. This book, authored by Malhotra and Ali, makes a good effort to explain the basic concepts of biosensors based on different types of nanomaterials.

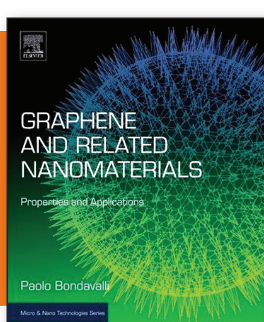
The first chapter is an introduction to the fundamentals and applications of nanomaterials and biosensors. The advantages of the use of engineered nanomaterials in biosensors, such as nanoscale size and compatibility with biological molecules, are discussed. For chapters 2–8, each chapter covers the properties and biosensing applications of a type of nanomaterial. Chapter 2 introduces carbon nanomaterials, such as fullerenes, carbon nanotubes, graphene, and graph-ene oxide, and their use in biosensors for monitoring different biological molecules, such as low-density lipoproteins (LDLs). The functionalization of carbon nanomaterials for biomolecule attachment is explored.

The concepts related to properties that characterize nanostructured metals and metal oxides are presented in chapter 3, with a focus on their use in point-of-care diagnosis and immunosensors. Chapter 4 provides a discussion on the properties of conducting polymers and their applications in biosensors and bioimaging. In chapter 5, the multifunctional properties of hybrid nanocomposites are discussed because of their promise as materials for biomolecular devices, especially for healthcare diagnostics. The issues related to coupling of plasmonic nanostructured materials with fiber-optic technology for the development of biosensors are discussed in chapter 6.

Chapter 7 explores the fundamental properties of different types of nanostructured biomaterials, specifically metallic, ceramic, polymeric, and composite for *in vivo* and *in vitro* biosensors. DNA biosensing principles are discussed in chapter 8. Various techniques for DNA detection and transduction methods are presented. This chapter also includes a description of the development of DNA biosensors and microarray-based devices. Chapter 9 addresses the integration of microfluidics with biosensors and the use of nanomaterials in microfluidic biosensors. An overview of the principles of microfluidics for chemical analysis of biomolecules is presented. Finally, the last chapter of the book discusses future developments in biosensors and their commercialization.

Each chapter ends with a suitable reference list and has a good number of illustrations. However, it contains no didactic exercises. This book is useful for introducing the concepts of nanomaterials-based biosensors and their applications, which is particularly relevant for students seeking knowledge in this field. It is suitable as a textbook for mid- and senior undergraduate level courses devoted to biosensors in materials science, physics, chemistry, and engineering sciences.

***Reviewer: Mariana Amorim Fraga**, professor and researcher, Applied Nanoscience and Plasma Technology Group, Universidade Brasil, Brazil.*



Graphene and Related Nanomaterials: Properties and Applications

Paolo Bondavalli

Elsevier, 2017
192 pages, $150.00
ISBN 9780323481014

This is an outstanding book on graphene and related materials, including carbon nanotubes, graphene oxide (GO), and reduced graphene oxide (R-GO). Four chapters cover the fabrication, fundamental properties, and characterization of carbon-based materials and devices. This book will be useful for researchers working in graphene materials in the applied physics, chemistry, and materials science areas.

Chapter 1 starts with fundamentals of carbon atomic configuration. Fundamental properties and various applications of carbon allotropes such as fullerenes and nanotubes are discussed in detail. Transfer characteristics, band diagrams, and sensor performance of carbon-based devices, such as transistors and sensors, are explained with the help of experimental and simulated data for various input conditions. A brief history about the discovery of graphene is given at the end of the chapter.

The second chapter is dedicated to nonvolatile memory devices based on graphene nanomaterials. Switching behavior, current–voltage (I–V) characteristics, and repeatability during hundreds of cycles of graphene-based devices are discussed in detail, along with the SEM and HRTEM images of those devices. Tables present the results (e.g., switching time, retention time, cyclability) obtained from the various nonvolatile memories built with graphene, GO,

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