

Nanomaterials in Glucose Sensing

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Series Editors' Preface

Biomedical and Nanomedical Technologies (B&NT)

This **concise** monograph series focuses on the implementation of various engineering principles in the conception, design, development, analysis and operation of biomedical, biotechnological and nanotechnology systems and applications. The primary objective of the series is to compile the latest research topics in biomedical and nanomedical technologies, specifically devices and materials.

Each volume comprises a collection of invited manuscripts, written in an accessible manner and of a concise and manageable length. These timely collections will provide an invaluable resource for initial enquiries about technologies, encapsulating the latest developments and applications with reference sources for further detailed information. The content and format have been specifically designed to stimulate further advances and applications of these technologies by reaching out to the non-specialist across a broad audience.

Contributions to *Biomedical and Nanomedical Technologies* will inspire interest in further research and development using these technologies and encourage other potential applications. This will foster the advancement of biomedical and nanomedical applications, ultimately improving healthcare delivery.

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Abstract

The smartness of nano-materials is attributed to their nanoscale and subsequently unique physicochemical properties and their use in glucose sensing has been aimed at improving performance, reducing cost and miniaturizing the sensor and its associated instrumentation. So far, portable (handheld) glucose analysers were introduced for hospital wards, emergency rooms and physicians' offices; single-use strip systems achieved nanolitre sampling for painless and accurate home glucose monitoring; advanced continuous monitoring devices having 2 to 7 days operating life are in clinical and home use; and continued research efforts are being made to develop and introduce increasingly advanced glucose monitoring systems for health as well as for food, biotechnology, cell and tissue culture industries. Nanomaterials have touched every aspect of biosensor design and this monograph reviews their role in the development of advanced technologies for glucose sensing, and especially for diabetes management.

Research shows that overall, nanomaterials help address the problems with conventional optical and electrochemical biosensors, by enhancing the preferential detection of glucose or its oxidation products through better electron transfer kinetics, sensitivity and response time, while lowering the operating over-voltages for energy efficiency and avoid interference. The reproducible production of nano-materials and nano-structures at low cost is vital for the successful development of nano-technologies for glucose sensing. Several products, especially, home glucose monitoring devices, use nano-materials, but the need for reliable long-term CGM is still unmet. Nano-materials and nano-technologies have an important role in achieving the long-awaited CGM technology.

