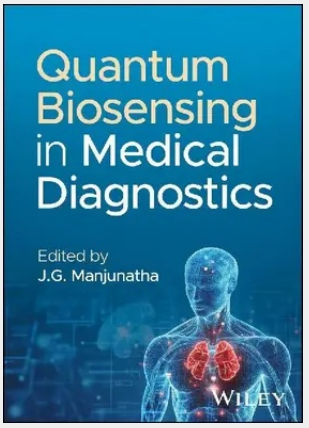
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Quantum Biosensing in Medical Diagnostics



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Presents cutting-edge insights into quantum biosensors for disease detection and medical diagnostics The rapid evolution of biosensing technologies has transformed the field of medical diagnostics. By enabling the identification of biological events at the scale of single molecules or ions, quantum biosensors hold the potential to revolutionize early detection, guide personalized treatment strategies, and offer fresh mechanistic insights into disease pathways. Quantum Biosensing in Medical Diagnostics explores how quantum mechanics is being harnessed to achieve unprecedented levels of precision in disease detection and patient monitoring. This in-depth volume brings together international experts to survey the current state of quantum biosensing, covering fundamental principles, enabling technologies, clinical applications, and future prospects. Detailed chapters span a wide range of topics, including quantum dots as fluorescent probes, photonic quantum sensors, quantum resonance imaging, and emerging applications in oncology, cardiovascular diagnostics, neurodegenerative diseases, and infectious disease monitoring. The contributors also highlight innovative uses of quantum biosensing in drug discovery, biomarker identification, environmental monitoring, and precision medicine. Examining both the promise and challenges of quantum biosensors, Quantum Biosensing in Medical Diagnostics: - Integrates interdisciplinary perspectives from chemistry, physics, biology, and engineering - Highlights case studies demonstrating diagnostic applications across multiple disease areas - Examines quantum approaches to imaging, metabolomics, and omics-based diagnostics - Evaluates challenges in sensor stability, scalability, and integration into existing platforms - Addresses the role of quantum biosensors in personalized and precision medicine - Explores applications beyond healthcare, including environmental monitoring and public health Providing a rigorous and up-to-date foundation for those navigating the future of biomedical diagnostics in the quantum era, Quantum Biosensing in Medical Diagnostics is an invaluable resource for graduate students, postgraduate researchers, and academics in medicinal chemistry, biochemistry, biophysics, and bioengineering. It is also a key reference for pharmaceutical industry professionals working in drug discovery, biomarker development, and diagnostic innovation.

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