

## Biomedical Photonics Handbook, Second Edition: Fundamentals, Devices, and Techniques (Volume 3)

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**Biomedical Photonics Handbook, Second Edition: Fundamentals, Devices, and Techniques (Volume 3)** From CRC Press

*Shaped by Quantum Theory, Technology, and the Genomics Revolution*

The integration of photonics, electronics, biomaterials, and nanotechnology holds great promise for the future of medicine. This topic has recently experienced an explosive growth due to the noninvasive or minimally invasive nature and the cost-effectiveness of photonic modalities in medical diagnostics and therapy. The second edition of the **Biomedical Photonics Handbook** presents recent fundamental developments as well as important applications of biomedical photonics of interest to scientists, engineers, manufacturers, teachers, students, and clinical providers. The first volume, **Fundamentals, Devices, and Techniques**, focuses on the fundamentals of biophotonics, optical techniques, and devices.

Represents the Collective Work of over 150 Scientists, Engineers, and Clinicians

Designed to display the most recent advances in instrumentation and methods, as well as clinical applications in important areas of biomedical photonics to a broad audience, this three-volume handbook provides an inclusive forum that serves as an authoritative reference source for a broad audience involved in the research, teaching, learning, and practice of medical technologies.


What's New in This Edition:

A wide variety of photonic biochemical sensing technologies has already been developed for clinical monitoring of physiological parameters, such as blood pressure, blood chemistry, pH, temperature, and the presence of pathological organisms or biochemical species of clinical importance. Advanced photonic detection technologies integrating the latest knowledge of genomics, proteomics, and metabolomics allow sensing of early disease states, thus revolutionizing the medicine of the future. Nanobiotechnology has opened new possibilities for detection of biomarkers of disease, imaging single molecules, and *in situ* diagnostics at the single-cell level. In addition to these state-of-the-art advancements, the second edition contains new topics and chapters including:

- Fiber Optic Probe Design
- Laser and Optical Radiation Safety
- Photothermal Detection
- Multidimensional Fluorescence Imaging
- Surface Plasmon Resonance Imaging
- Molecular Contrast Optical Coherence Tomography
- Multiscale Photoacoustics
- Polarized Light for Medical Diagnostics
- Quantitative Diffuse Reflectance Imaging
- Interferometric Light Scattering
- Nonlinear Interferometric Vibrational Imaging
- Multimodality Theranostics Nanoplatfoms
- Nanoscintillator-Based Therapy
- SERS Molecular Sentinel Nanoprobes
- Plasmonic Coupling Interference Nanoprobes

Comprised of three books: **Volume I: Fundamentals, Devices, and Techniques; Volume II: Biomedical Diagnostics; and Volume III: Therapeutics and Advanced Biophotonics**, this second edition contains eight sections, and provides introductory material in each chapter. It also includes an overview of the topic, an extensive collection of spectroscopic data, and lists of references for further reading.

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### Editorial Review

#### Review

"Excellent book! Sheds new, latest and important light on the field of biomedical photonics. The second edition has put together a comprehensive resource covering all aspects of photonics in the field of biomedicine under three volumes. The use of practical examples summarizing real-world examples by scientists and engineers allows a collective look into the current best practices. This book will be valuable to anyone seeking to understand the complexities of designing fiber optic instruments, techniques involved behind analysis, diagnostics nuances and therapeutic modalities. Students and practitioners will learn about the latest tools and techniques used by leading researchers, scientists and engineers. A great compilation of varied research fields in the area of Biophotonics. Especially, a great reference book as topics are effectively dealt in-depth with lots of citations after each chapter."

?Dr. Shanthi Prince, SRM University, India

"No one has, or ever will, attempt to create such a comprehensive text in this field. It is an enormous undertaking that we are all grateful to have, but would not want to do it ourselves."

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"... extensive and comprehensive coverage, resulting in an additional two volumes of material in this new edition ... [containing] the latest research and technology in biomedical optics/photonics."

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"I like the breadth of topics, particularly the fact that they cover fundamental issues as well as advanced research areas. ... exhaustive coverage of biomedical optics starting from the very basic fundamentals to a wide variety of cutting-edge concepts. This makes the text ideal for all levels of readers?from undergraduate students to senior researchers."

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?António Miguel Morgado, University of Coimbra, Portugal

"This handbook is a step ahead in the sense that it brings together the recent advances in various fields of biomedical photonics. [It] serves as a teaching reference as well as a research guide."

?Renu John, Indian Institute of Technology Hyderabad, Telangana

#### About the Author

**Tuan Vo-Dinh** is the R. Eugene and Susie E. Goodson Distinguished Professor of biomedical engineering, professor of chemistry, and director of the Fitzpatrick Institute for Photonics at Duke University. He received a B.S. in physics in 1970 from EPFL (Ecole Polytechnique Federal de Lausanne) in Lausanne and a Ph.D. in physical chemistry in 1975 from ETH (Swiss Federal Institute of Technology) in Zurich, Switzerland. Dr.

Vo-Dinh has authored over 350 publications in peer-reviewed scientific journals. He is the author of a textbook on spectroscopy and editor of 6 books. He has received numerous awards and holds over 37 U.S. and international patents.

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#### **Louise Denison:**

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