

### A Muddled Look at Medical Imaging

#### **Biomedical Optical Imaging**

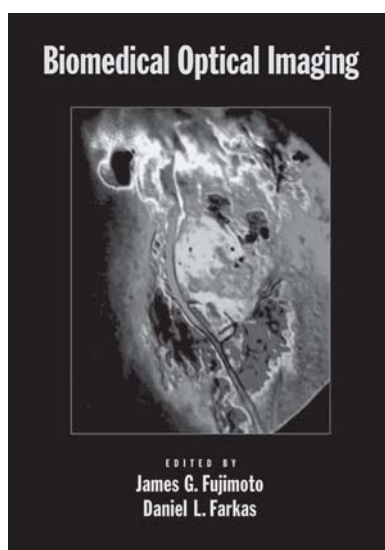
Edited by James G. Fujimoto and Daniel L. Farkas

440 pp. Oxford University Press. \$90

*Review by Steven Ruzin*

Published in 2009, *Biomedical Optical Imaging* is a timely reference book for advanced microscopists and diagnostic imaging specialists. The coverage is thorough, and except for a few chapters, it is targeted to an audience with a high level of expertise. This not a beginner's book but an in-depth reference text for those wishing to understand highly advanced optical techniques for (medical) research and/or optical instrument design. This quality — advanced optical *plus* advanced diagnostics — is perhaps its major flaw but not the only one.

The most egregious defect is that it appears to have undergone no copyediting whatsoever. On nearly every page, regardless of chapter or author, there are myriad misspellings. They are not your everyday typos, but rather mistakes in typesetting — words strung together and others split at random positions — so that reading the text is difficult and distracting. Here are a few glaring examples: “anothername fora plot” (Chapter 2), “tumorcells differin theirmRNA” (Chapter 4), “semiconductornanocr ystals” (Chapter 5), and “light forpr obing molecularevents” (Chapter 14). Most of the time one can read the mangled text, but on other occasions it is a challenge. (Perhaps the typesetters didn't turn on their spell checker.) Reasons aside, this book should not have been published in this form, especially from such a respected pub-



lisher as Oxford University Press.

The breadth of topics is ambitious, ranging from pure microscopy (confocal, two-photon fluorescence correlation spectroscopy, optical coherence tomography) to practical medical applications (fluorescence for medical diagnostics, detecting cervical neoplasia, detecting brain activity using near-IR). Although the editors may have thought that this variety was a good idea, it makes for an uneven text and one that cannot decide whether it is a treatise of high-tech optical microscopy techniques or a how-to book on medical (cancer) imaging.

Another problem is that, except for the last chapter, there is no reference newer than 2002; the majority of references are in the mid- to late 1990s. The ramifications of this, of course, is that for the rapidly evolving technology in the field of imaging, many topics are missing or dated. For example, structured illumination microscopy is not discussed in the chapter on “Nanoscopy” (Chapter 9), DsRED is described as being “recently discovered” (Chapter 8), and the application of EMCCD cameras for fluorescence imaging is missing completely.

Typical to anthologies, the information is variable. Several chapters describe their topic in exceedingly rich theoretical detail, whereas other sections cover a subject only superficially. For example, the chapter on Nanoscopy describes most modern attempts at achieving super resolution in optical microscopy both theoretically and, for the most part, practically. They describe in great detail the basis behind such optical techniques as 4Pi and STED microscopy.

Similarly, the chapter on Diffuse Optical Spectros-

copy (DOS) discusses in gory detail the theory behind and instrumentation required for using this technique to study a range of medical related topics from exercise physiology to breast cancer. In comparison, the chapter on Fluorescence Imaging in Medical Diagnostics presents a cursory view of dated techniques for the majority of the chapter. Only at the end does it cover timely topics such as Fourier transform spectroscopic and fluorescence lifetime imaging.

Due to its high level of detail this is not the kind of book that one casually reads. It is more likely to be used to understand a particular microscope imaging technique or medical diagnostic technique that involves imaging. While you would certainly need to consult other, more elementary books to get background information missing in the more advanced

chapters, *Biomedical Optical Imaging* generally succeeds in presenting topics in a comprehensive view of contemporary imaging.

Unfortunately, the book's shortcomings overwhelm its positive aspects. My main criticisms are 1) there are no described techniques or examples newer than 2002, 2) coverage of topics ranges from the superficial to mathematically comprehensive — or incomprehensible, 3) the medical component of the book is mostly limited to cancer diagnosis, and 4) the careless lack of manuscript proofreading.

However, once these problems — at least the inexcusable typos — are solved in the next edition, *Biomedical Optical Imaging* has the potential of becoming an important part of the advanced microscopist's reference library.

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