

This is the first book providing a comprehensive overview of the clinical applications of multimodality optical imaging, related technological development, and translational steps towards wide clinical acceptance. It will provide the reader with a full picture of the development and applications of multimodality optical imaging platforms from bench to bedside, from an academic, regulatory, and industrial standpoint.

Chapters in the book are clustered by technical content. Due to the interdisciplinary aspect of the subject, readers will have different background and interests. The chapters cover all aspects of multimodality optical imaging in clinical settings. Readers may navigate easily through the book to find information relevant to their interests.

We have included a CD-ROM with the book. This CD-ROM contains full-color versions of all figures in the book, which further illustrate the topics discussed herein. Additionally, we have provided three freely installable software platforms for development of advanced imaging applications:

- *XIP (eXtensible Imaging Platform)*: XIP is an open-source environment for rapidly developing medical imaging applications from a set of modular software elements. This platform makes it easy to access specific postprocessing applications at multiple sites; it supports the DICOM standard and is fully compatible with the ITK (www.itk.org) and VTK (www.vtk.org) open-source libraries. XIP has the capability of simplifying workflows and speeding data processing and analysis. XIP is an initiative of the Cancer Bioinformatics Grid (caBIG) program created by the National Cancer Institute to facilitate the sharing of IT infrastructure, data, and applications.
- *TOAST (Time-resolved Optical Absorption and Scattering Tomography)*: TOAST is a software toolbox for the simulation of light transport in highly scattering media (the forward model) and the reconstruction of the spatial distribution of absorption and scattering coefficients from time-resolved transillumination measurements at the boundary (the inverse model). TOAST is under active development at University College London, Department of Computer Science and the Centre for Medical Image Computing (CMIC).
- *NIRFAST (Near Infrared Frequency domain optical Absorption and Scatter Tomography)*: NIRFAST is an open source FEM-based software package designed for modeling near infrared frequency domain light transport in tissue. NIRFAST solves for the frequency domain diffusion approximation, for 2D or 3D problems. It also solves for the image reconstruction to provide simultaneous solution of optical properties using log amplitude and phase data. NIRFAST was developed and is maintained by the Near Infrared Imaging Group, Thayer School of Engineering at Dartmouth College, and by the School of Physics at the University of Exeter.

Overall, we expect this book will help the reader obtain a better understanding of:

- The main concepts and physical phenomena involved in optical imaging, as well as the detailed theory behind diffuse optical imaging;