



## **Second Harmonic Generation Imaging (Series in Cellular and Clinical Imaging)**

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Second-harmonic generation (SHG) microscopy has shown great promise for imaging live cells and tissues, with applications in basic science, medical research, and tissue engineering. **Second Harmonic Generation Imaging** offers a complete guide to this optical modality, from basic principles, instrumentation, methods, and image analysis to biomedical applications. The book features contributions by experts in second-harmonic imaging, including many pioneering researchers in the field. Written for researchers at all levels, it takes an in-depth look at the current state of the art and possibilities of SHG microscopy.

Organized into three sections, the book:

- Provides an introduction to the physics of the process, step-by-step instructions on how to build an SHG microscope, and comparisons with related imaging techniques
- Gives an overview of the capabilities of SHG microscopy for imaging tissues and cells?including cell membranes, muscle, collagen in tissues, and microtubules in live cells?by summarizing experimental and analytical methods
- Highlights representative biomedical and medical applications in imaging cancer, fibroses, autoimmune diseases, connective tissue disorders, eye pathologies, and cardiovascular disease

Historically, clinical imaging at the cellular and tissue level has been performed by pathologists on *ex vivo* biopsies removed by the surgeon. While histology remains the "gold standard" for pathologists, its interpretation remains highly subjective. Much of SHG research has focused on developing more quantitative, objective metrics. A tutorial for newcomers and an up-to-date review for experts, this book explores how SHG may be used to more precisely image a wide range of pathological conditions and diseases.

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