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This monograph focuses on modern femtosecond laser microscopes for two photon imaging and nanoprocessing, on laser tweezers for cell micromanipulation as well as on fluorescence lifetime imaging (FLIM) in Life Sciences. The book starts with an introduction by Dr. Wolfgang Kaiser, pioneer of nonlinear optics and ends with the chapter on clinical multiphoton tomography, the novel high resolution imaging technique. It includes a foreword by the nonlinear microscopy expert Dr. Colin Sheppard. Contents Part I: Basics Brief history of fluorescence lifetime imaging The long journey to the laser and its use for nonlinear optics Advanced TCSPC-FLIM techniques Ultrafast lasers in biophotonics Part II: Modern nonlinear microscopy of live cells STED microscopy: exploring fluorescence lifetime gradients for super-resolution at reduced illumination intensities Principles and applications of temporal-focusing wide-field two-photon microscopy FLIM-FRET microscopy TCSPC FLIM and PLIM for metabolic imaging and oxygen sensing Laser tweezers are sources of two-photon effects Metabolic shifts in cell proliferation and differentiation Femtosecond laser nanoprocessing Cryomultiphoton imaging Part III: Nonlinear tissue imaging Multiphoton Tomography (MPT) Clinical multimodal CARS imaging In vivo multiphoton microscopy of human skin Two-photon microscopy and fluorescence lifetime imaging of the cornea Multiscale correlative imaging of the brain Revealing interaction of dyes and nanomaterials by multiphoton imaging Multiphoton FLIM in cosmetic clinical research Multiphoton microscopy and fluorescence lifetime imaging for resection guidance in malignant glioma surgery Non-invasive single-photon and multi-photon imaging of stem cells and cancer cells in mouse models Bedside assessment of multiphoton tomography