Contents

1 Fundamentals of Optical Microscopy ........................................... 1
   Franco Quercioli

2 The White Confocal: Continuous Spectral Tuning in Excitation
   and Emission ............................................................... 37
   Rolf Borlinghaus

3 Second/Third Harmonic Generation Microscopy ...................... 55
   Shakil Rehman, Naveen K. Balla, Elijah Y.Y. Seng,
   and Colin J.R. Sheppard

4 Role of Scattering and Nonlinear Effects in the Illumination
   and the Photobleaching Distribution Profiles ......................... 75
   Zeno Lavagnino, Francesca Cella Zanacchi, and Alberto Diaspro

5 New Analytical Tools for Evaluation of Spherical Aberration
   in Optical Microscopy ................................................ 85
   Isabel Escobar, Emilio Sánchez-Ortega, Genaro Saavedra,
   and Manuel Martínez-Corral

6 Improving Image Formation by Pushing the Signal-to-Noise Ratio ... 101
   Emiliano Ronzitti, Giuseppe Vicidomini, Francesca Cella Zanacchi,
   and Alberto Diaspro

7 Site-Specific Labeling of Proteins in Living Cells Using Synthetic
   Fluorescent Dyes .......................................................... 111
   Gertrude Bunt

8 Imaging Molecular Physiology in Cells Using FRET-Based
   Fluorescent Nanosensors ............................................... 131
   Fred S. Wouters
9 Measuring Molecular Dynamics by FRAP, FCS, and SPT .......... 153
   Kevin Braeckmans, Hendrik Deschout, Jo Demeester,
   and Stefaan C. De Smedt

10 In Vitro–In Vivo Fluctuation Spectroscopies ..................... 165
   M. Collini, L. D’Alfonso, M. Caccia, L. Sironi, M. Panzica,
   G. Chirico, I. Rivolta, B. Lettieri, and G. Miserocchi

11 Interference X-ray Diffraction from Single Muscle Cells Reveals
   the Molecular Basis of Muscle Braking ........................... 183
   L. Fusi, E. Brunello, M. Reconditi, R. Elangovan, M. Linari,
   Y.-B. Sun, T. Narayanan, P. Panine, G. Piazzesi, M. Irving,
   and V. Lombardi

12 Low Concentration Protein Detection Using Novel
   SERS Devices ................................................................. 191
   Gobind Das, Francesco Gentile, Maria Laura Coluccio, G. Cojoc,
   Federico Mecarini, Francesco De Angelis, Patrizio Candeloro,
   Carlo Liberale, and Enzo Di Fabrizio

13 Near Infrared Three-Dimensional Nonlinear Optical Monitoring
   of Stem Cell Differentiation ........................................... 211
   Uday K. Tirlapur and Clarence Yapp

14 A Correlative Microscopy: A Combination of Light and Electron
   Microscopy ............................................................... 231
   Umberto Fascio and Anna Sartori-Rupp

Index ................................................................. 239