

CONTENTS

Preface	ix
Acknowledgments	xi
Contributors	xiii
 PART I BASICS OF MOLECULAR IMAGING AND NANOBIOTECHNOLOGY	
1. Basic Principles of Molecular Imaging <i>Sven H. Hausner</i>	3
2. Synthesis of Nanomaterials as a Platform for Molecular Imaging <i>Jinhao Gao, Jin Xie, Bing Xu, and Xiaoyuan Chen</i>	25
3. Nanoparticle Surface Modification and Bioconjugation <i>Jin Xie, Jinhao Gao, Mark Michalski, and Xiaoyuan Chen</i>	47
4. Biodistribution and Pharmacokinetics of Nanoprobes <i>Nagesh Kolishetti, Frank Alexis, Eric M. Pridgen, and Omid C. Farokhzad</i>	75
 PART II NANOPARTICLES FOR SINGLE MODALITY MOLECULAR IMAGING	
5. Computed Tomography as a Tool for Anatomical and Molecular Imaging <i>Pingyu Liu, Hu Zhou, and Lei Xing</i>	107
6. Carbon Nanotube X-Ray for Dynamic Micro-CT Imaging of Small Animal Models <i>Otto Zhou, Guohua Cao, Yueh Z. Lee, and Jianping Lu</i>	139
7. Quantum Dots for <i>In Vivo</i> Molecular Imaging <i>Yun Xing</i>	159
8. Biopolymer, Dendrimer, and Liposome Nanoplatfoms for Optical Molecular Imaging <i>David Pham, Ling Zhang, Bo Chen, and Ella Fung Jones</i>	183

9. Nanoplatforms for Raman Molecular Imaging in Biological Systems	197
<i>Zhuang Liu</i>	
10. Single-Walled Carbon Nanotube Near-Infrared Fluorescent Sensors for Biological Systems	217
<i>Jingqing Zhang and Michael S. Strano</i>	
11. Microparticle- and Nanoparticle-Based Contrast-Enhanced Ultrasound Imaging	233
<i>Nirupama Deshpande and Jürgen K. Willmann</i>	
12. Ultrasound-Based Molecular Imaging Using Nanoagents	263
<i>Srivalleesha Mallidi, Mohammad Mehrmohammadi, Kimberly Homan, Bo Wang, Min Qu, Timothy Larson, Konstantin Sokolov, and Stanislav Emelianov</i>	
13. MRI Contrast Agents Based on Inorganic Nanoparticles	279
<i>Hyon Bin Na and Taeghwan Hyeon</i>	
14. Cellular Magnetic Labeling with Iron Oxide Nanoparticles	309
<i>Sébastien Boutry, Sophie Laurent, Luce Vander Elst, and Robert N. Muller</i>	
15. Nanoparticles Containing Rare Earth Ions: A Tunable Tool for MRI	333
<i>C. Rivière, S. Roux, R. Bazzi, J.-L. Bridot, C. Billotey, P. Perriat, and O. Tillement</i>	
16. Microfabricated Multispectral MRI Contrast Agents	375
<i>Gary Zabow and Alan Koretsky</i>	
17. Radiolabeled Nanoplatforms: Imaging Hot Bullets Hitting Their Target	399
<i>Raffaella Rossin</i>	
 PART III NANOPARTICLE PLATFORMS AS MULTIMODALITY IMAGING AND THERAPY AGENTS	
18. Lipoprotein-Based Nanoplatforms for Cancer Molecular Imaging	433
<i>Ian R. Corbin, Kenneth Ng, and Gang Zheng</i>	
19. Protein Cages as Multimode Imaging Agents	463
<i>Masaki Uchida, Lars Liepold, Mark Young, and Trevor Douglas</i>	
20. Biomedical Applications of Single-Walled Carbon Nanotubes	481
<i>Weibo Cai, Ting Gao, and Hao Hong</i>	
21. Multifunctional Nanoparticles for Multimodal Molecular Imaging	529
<i>Yanglong Hou and Rui Hao</i>	
22. Multifunctional Nanoparticles for Cancer Theragnosis	541
<i>Seulki Lee, Ick Chan Kwon, and Kwangmeyung Kim</i>	

23. Nanoparticles for Combined Cancer Imaging and Therapy	565
<i>Vaishali Bagalkot, Mi Kyung Yu, and Sangyong Jon</i>	
24. Multimodal Imaging and Therapy with Magnetofluorescent Nanoparticles	593
<i>Jason R. McCarthy and Ralph Weissleder</i>	
25. Gold Nanocages: A Multifunctional Platform for Molecular Optical Imaging and Photothermal Treatment	615
<i>Leslie Au, Claire M. Cobley, Jingyi Chen, and Younan Xia</i>	
26. Theranostic Applications of Gold Nanoparticles in Cancer	639
<i>Parmeswaran Diagaradjane, Pranshu Mohindra, and Sunil Krishnan</i>	
27. Gold Nanorods as Theranostic Agents	659
<i>Alexander Wei, Qingshan Wei, and Alexei P. Leonov</i>	
28. Theranostic Applications of Gold Core–Shell Structured Nanoparticles	683
<i>Wei Lu, Marites P. Melancon, and Chun Li</i>	
29. Magnetic Nanoparticle Carrier for Targeted Drug Delivery: Perspective, Outlook, and Design	709
<i>R. D. K. Misra</i>	
30. Perfluorocarbon Nanoparticles: A Multidimensional Platform for Targeted Image-Guided Drug Delivery	725
<i>Gregory M. Lanza, Shelton D. Caruthers, Anne H. Schmieder, Patrick M. Winter, Tillmann Cyrus, and Samuel A. Wickline</i>	
31. Radioimmunonanoparticles for Cancer Imaging and Therapy	755
<i>Arutselvan Natarajan</i>	
PART IV TRANSLATIONAL NANOMEDICINE	
32. Current Status and Future Prospects for Nanoparticle-Based Technology in Human Medicine	783
<i>Nuria Sanvicens, Fátima Fernández, J.-Pablo Salvador, and M.-Pilar Marco</i>	
Index	815