# Contents

*Preface* .......................................................... v

*Contributors* .................................................. xi

## Part I Ingredients of Bioluminescent Probes

1. Label-Free Cell Phenotypic Identification of d-Luciferin as an Agonist for GPR35 .......................... 3
   *Heidi Hu, Huayun Deng, and Ye Fang*

2. Synthetic Bioluminescent Coelenterazine Derivatives .................................................. 19
   *Ryo Nishihara, Daniel Citterio, and Koji Suzuki*

3. Molecular Cloning of Secreted Luciferases from Marine Planktonic Copepods ......................... 33
   *Yasuhiro Takenaka, Kazubo Ikeo, and Yasushi Shigeri*

4. How to Fabricate Functional Artificial Luciferases for Bioassays ........................................ 43
   *Sung-Bae Kim and Rika Fujii*

5. Quantum Yield Determination Based on Photon Number Measurement, Protocols for Firefly Bioluminescence Reactions .................................................. 55
   *Kazuki Niwa*

## Part II Fabrication of Bioluminescent Probes

6. Bioluminescent Ligand–Receptor Binding Assays for Protein or Peptide Hormones .................. 65
   *Ya-Li Liu and Zhan-Yun Guo*

7. Bioluminogenic Imaging of Aminopeptidase N In Vitro and In Vivo ...................................... 91
   *Wenxiao Wu, Laizhong Chen, Jing Li, Lupei Du, and Minyong Li*

8. Firefly Luciferase-Based Sequential Bioluminescence Resonance Energy Transfer (BRET)-Fluorescence Resonance Energy Transfer (FRET) Protease Assays ................. 101
   *Bruce Branchini*

   *Yunfei Zhang, J. Brian Robertson, Qiguang Xie, and Carl Hirschie Johnson*

10. A Protein–Protein Interaction Assay FlimPIA Based on the Functional Complementation of Mutant Firefly Luciferases ............................................. 131
    *Yuki Ohmuro-Matsuyama and Hiroshi Ueda*

11. Single-Chain Probes for Illuminating Androgenicity of Chemicals ...................................... 143
    *Sung-Bae Kim and Hiroaki Tao*
12 Multicolor Imaging of Bifacial Activities of Estrogens
Sung-Bae Kim and Yoshio Umezawa

13 Circular Permutation Probes for Illuminating Phosphorylation of Estrogen Receptor
Sung-Bae Kim and Hiroaki Tao

14 Fabrication of Molecular Strain Probes for Illuminating Protein–Protein Interactions
Sung-Bae Kim and Rika Fujii

15 An ALuc-Based Molecular Tension Probe for Sensing Intramolecular Protein–Protein Interactions
Sung-Bae Kim, Ryo Nishihara, and Koji Suzuki

16 Live Cell Bioluminescence Imaging in Temporal Reaction of G Protein-Coupled Receptor for High-Throughput Screening and Analysis
Mitsuru Hattori and Takeaki Ozawa

17 Imaging Histone Methylations in Living Animals
Thillai V. Sekar and Ramasamy Paulmurugan

18 Preparation and Assay of Simple Light Off Biosensor Based on Immobilized Bioluminescent Bacteria for General Toxicity Assays
G.V.M. Gabriel and V.R. Viviani

Part III Applications to Living Subjects and Instrumentations

19 In Vivo Bioluminescent Imaging of ATP-Binding Cassette Transporter-Mediated Efflux at the Blood–Brain Barrier
Joshua Bakhsheshian, Bih-Rong Wei, Matthew D. Hall, R. Mark Simpson, and Michael M. Gottesman

20 Theranostic Imaging of Cancer Gene Therapy
Thillai V. Sekar and Ramasamy Paulmurugan

21 Development of a Multicolor Bioluminescence Imaging Platform to Simultaneously Investigate Transcription Factor NF-κB Signaling and Apoptosis
Vicky T. Knol-Blankvoort, Laura Mezzanotte, Martijn J.W.E. Rabelink, Clemens W.G.M. Lowik, and Eric L. Kaijzel

22 A Multichannel Bioluminescence Determination Platform for Bioassays
Sung-Bae Kim and Ryuichi Naganawa

23 A Bioluminescence Assay System for Imaging Metal Cationic Activities in Urban Aerosols
Sung-Bae Kim, Ryuichi Naganawa, Shingo Murata, Takayoshi Nakayama, Simon Miller, and Toshiya Senda

24 Luminescence Imaging: (a) Multicolor Visualization of Ca²⁺ Dynamics in Different Cellular Compartments and (b) Video-Rate Tumor Detection in a Freely Moving Mouse
Kenta Saito, Masahiro Nakano, and Takeharu Nagai
Bioluminescence
Methods and Protocols
Kim, S.-B. (Ed.)
2016, XIII, 314 p. 100 illus., 84 illus. in color., Hardcover
ISBN: 978-1-4939-3811-7
A product of Humana Press