

# Contents

<b>1</b>	<b>A Brief Introduction to Optical Nanoprobes</b>	<b>1</b>
1.1	Nanomaterials	1
1.2	Recognition Units	3
1.3	Optical Detection	4
	References	5
<b>2</b>	<b>Colorimetric Nanoprobes</b>	<b>9</b>
2.1	Optical Absorption Properties of Nanomaterials	9
2.2	Colorimetric Sensing Strategies	14
2.2.1	Aggregation-Based Methods	14
2.2.2	Single Particle Morphology-Based Methods	20
2.3	Applications	22
2.3.1	Ionic Detection	22
2.3.2	Detection of Small Organic Molecules	34
2.3.3	Detection of Oligonucleotides	37
2.3.4	Detection of Proteins	39
2.3.5	Sensing of Cancer Cells	41
	References	43
<b>3</b>	<b>Fluorescent Nanoprobes</b>	<b>49</b>
3.1	Fluorescence Properties of Nanomaterials	49
3.1.1	Quantum Dots	49
3.1.2	Noble Metal Nanoclusters	51
3.1.3	Upconversion Nanoparticles	51
3.1.4	Carbon Nanostructures	52
3.2	Typical Fluorescence Sensing Strategies	53
3.2.1	Target Induced Signal Variation	55
3.2.2	Aggregation or Anti-Aggregation Induced Signal Variation	56
3.2.3	Fluorescence Resonance Energy Transfer System	56
3.2.4	Fluorescence Imaging	59
3.3	Applications	61
3.3.1	Heavy Metal Ion Detection	61
3.3.2	Small Molecule Detection	63

3.3.3	Nucleic Acid Detection . . . . .	63
3.3.4	Protein Detection . . . . .	64
3.3.5	Others . . . . .	64
	References . . . . .	70
<b>4</b>	<b>Surface-Enhanced Raman Scattering Nanoprobes . . . . .</b>	<b>75</b>
4.1	Introduction to Surface-Enhanced Raman Scattering Nanoprobes. . . . .	75
4.2	Optical Properties of SERS Nanoprobes. . . . .	76
4.3	Applications . . . . .	78
4.3.1	Aggregation or Anti-aggregation Induced Signal Variation . . . . .	79
4.3.2	Optical Labeling . . . . .	81
4.3.3	In situ and Real-Time Monitoring Chemical Reactions. . . . .	85
4.3.4	Intermolecular Interaction Characterization . . . . .	89
	References . . . . .	92
<b>5</b>	<b>Challenges and Perspectives of Optical Nanoprobes . . . . .</b>	<b>97</b>
	References . . . . .	99

Novel Optical Nanoprobes for Chemical and Biological  
Analysis

Chen, L.; Wang, Y.; Fu, X.; Chen, L.

2014, VIII, 100 p. 45 illus., 20 illus. in color., Softcover

ISBN: 978-3-662-43623-3