

Contents

1	General Introduction	1
1.1	Luminescence of Trivalent Lanthanide Ion	1
1.2	Luminescent Lanthanide Complex	2
1.3	Molecular Design for Enhancement of Luminescence of Lanthanide Complex	4
1.3.1	Suppression of Vibrational Relaxation	4
1.3.2	Control of Coordination Structure	6
1.4	Lanthanide Complex with Thermostability	7
1.5	Lanthanide Coordination Polymer	8
1.6	Objectives	9
1.7	Contents of this Thesis	9
	References	10
2	Luminescence Properties of Thermostable Lanthanide Coordination Polymers with Intermolecular Interactions	15
2.1	Introduction	15
2.2	Experimental Section	16
2.2.1	General	16
2.2.2	Syntheses	17
2.2.3	Crystallography	20
2.2.4	Optical Measurements	20
2.3	Results and Discussion	22
2.3.1	Coordination and Network Structures	22
2.3.2	Thermal Analyses	25
2.3.3	Photophysical Properties	26
2.3.4	Conclusions	29
	References	30
3	Chameleon Luminophore for a Wide Range Temperature-Sensor Composed of Lanthanide Coordination Polymers	31
3.1	Introduction	31
3.2	Experimental Section	33
3.2.1	General	33
3.2.2	Syntheses	33

3.2.3	Optical Measurements	34
3.3	Results and Discussion	35
3.3.1	Syntheses and Characterization of Eu/Tb Coordination Polymer	35
3.3.2	Temperature-Dependent Photosensitized Luminescence of Eu/Tb Coordination Polymer	39
3.4	Conclusions	41
	References	42
4	Characteristic Structures and Photophysical Properties of Nona-Coordinated Eu(III) Complexes with Tridentate Phosphine Oxides.	45
4.1	Introduction	45
4.2	Experimental Section	46
4.2.1	Materials	46
4.2.2	Apparatus	47
4.2.3	Syntheses	47
4.2.4	Crystallography	51
4.2.5	Optical Measurements	51
4.3	Results and Discussion	52
4.3.1	Syntheses and Coordination Structures	52
4.3.2	Photophysical Properties	54
4.4	Conclusions	58
	References	59
5	Photophysical Properties of Lanthanide Complexes with Asymmetric Dodecahedron Structures.	61
5.1	Introduction	61
5.2	Experimental Section	62
5.2.1	Materials	62
5.2.2	Apparatus	63
5.2.3	Syntheses	63
5.2.4	Crystallography	66
5.2.5	Optical Measurements	66
5.3	Results and Discussion	67
5.3.1	Coordination Structures	67
5.3.2	Photophysical Properties	70
5.4	Conclusions	79
	References	80
6	Solvent-Dependent Luminescence of Octa-Coordinated Eu(III) Complexes	81
6.1	Introduction	81
6.2	Experimental Section	82

6.2.1	Sample Preparation	82
6.2.2	Optical Measurements	82
6.3	Results and Discussion.	83
6.3.1	Effects of Deuterated Solvent.	83
6.3.2	Photophysical Properties in Various Organic Solvent . . .	84
6.4	Conclusion	87
	References	87
7	Summary.	89
	Curriculum Vitae	91

Highly Luminescent Lanthanide Complexes with Specific
Coordination Structures

Miyata, K.

2014, XIII, 91 p. 52 illus., 21 illus. in color., Hardcover

ISBN: 978-4-431-54943-7