



List of content

1 Introduction.....	1
1.1 Chalcogen.....	1
1.1.1 General.....	1
1.1.2 Physical and Chemical Properties.....	2
1.2 Rare earth elements.....	4
1.2.1 General.....	4
1.2.2 Physical and chemical properties.....	5
1.3 Lanthanide chalcogenide complexes derived from the reduction of chalcogen(ide)s by divalent lanthanide complexes.....	7
2 Aim of the project.....	13
3 Results and discussion.....	14
3.1 Polysulfide coordination clusters of the lanthanides.....	14
3.1.1 Synthesis.....	15
3.1.2 Structure.....	18
3.1.3 NIR analysis.....	22
3.2 Synthesis of dinuclear chalcogenides from the reduction of chalcogens by <i>N,N'</i> -chelating ligand supported low-valent metal complexes.....	24
3.2.1 Synthesis.....	25
3.2.2 Structure.....	27
3.3 Synthesis of lanthanide (Sm, Yb) aryl chalcogenides by redox reactions.....	34
3.3.1 Synthesis.....	35
3.3.2 Crystal structures.....	38
3.3.3 IR analysis.....	46
4 Experimental sections.....	48
4.1 General considerations.....	48
4.2 Synthesis of polysulfide clusters.....	48
4.2.1 Synthesis of [(DippForm) ₃ Sm ₃ S ₁₂ (THF) ₂] (1).....	48
4.2.2 Synthesis of [(DippForm) ₃ Yb ₃ S ₁₂ (THF) ₂]·2(C ₇ H ₈)·S ₈ (2).....	50
4.2.3 Synthesis of [(DippForm) ₂ YbCl(THF)] (3).....	50
4.3 Synthesis of dinuclear chalcogenides.....	51
4.3.1 General procedure for the Synthesis of [{(DippForm) ₂ LnE} ₂] (4-6).....	51
4.3.2 General procedure for the Synthesis of [(DippNafnaf)FeE] ₂] (7-9).....	52
4.4 Synthesis of lanthanide (Sm, Yb) aryl chalcogenides.....	53
4.4.1 General procedure for the Synthesis of [(DippForm) ₂ Ln(EPh)(THF)] (10-15).....	53
5 Crystal structure measurements.....	56
5.1 Data collection and refinement.....	56
5.2 Crystal Data.....	58
5.2.1 [(DippForm) ₃ Sm ₃ S ₁₂ (THF) ₂]·2(C ₇ H ₈)·S ₈ (1 Method A).....	58
5.2.2 [(DippForm) ₃ Sm ₃ S ₁₂ (THF) ₂]·3(C ₇ H ₈) (1 Method B).....	59
5.2.3 [(DippForm) ₃ Yb ₃ S ₁₂ (THF) ₂]·2(C ₇ H ₈)·S ₈ (2).....	60
5.2.4 [(DippForm) ₂ YbCl(THF)] (3).....	61
5.2.5 [{(DippForm) ₂ SmSe} ₂]·0.5(C ₇ H ₈) (4).....	62



5.2.6 [(DippForm) ₂ SmTe ₂](C ₇ H ₈) (5)	63
5.2.7 [(DippForm) ₂ YbSe ₂](C ₇ H ₈) (6)	64
5.2.8 [(DippNafnaf)FeS ₂] (7)	65
5.2.9 [(DippNafnaf)FeSe ₂] (8)	66
5.2.10 [(DippNafnaf)FeTe ₂](C ₇ H ₈) (9)	67
5.2.11 [(DippForm) ₂ Sm(SPh)(THF)] (10)	68
5.2.12 [(DippForm) ₂ Yb(SPh)(THF)](C ₇ H ₈) (11)	69
5.2.13 [(DippForm) ₂ Sm(SePh)(THF)](C ₇ H ₈) (12)	70
5.2.14 [(DippForm) ₂ Yb(SePh)(THF)](C ₇ H ₈) (13)	71
5.2.15 [(DippForm) ₂ Sm(TePh)(THF)](C ₇ H ₈) (14)	72
5.2.16 [(DippForm) ₂ Yb(TePh)(THF)](C ₇ H ₈) (15)	73
5.2.17 [(DippForm) ₂ Sm(SeC ₆ F ₅)(THF)](C ₆ H ₁₂) (16)	74
5.2.18 [(DippForm) ₂ Yb(SeC ₆ F ₅)]·0.5(C ₆ H ₁₂) (18)	75
5.2.19 [(DippForm) ₂ Sm(SeC ₆ F ₄ OMe)(THF)](C ₆ H ₁₂) (19)	76
5.2.20 [(DippForm) ₂ Yb(SeC ₆ F ₄ OMe)(THF)] (20)	77
5.2.21 [(DippForm) ₂ Yb(SeC ₆ F ₄ OMe)] (21)	78
5.2.22 (BBED ₂ Sm ₂) (22)	79
5.2.23 [BABCD{SmI(BTSA)(THF)} ₂] (23)	80
5.2.24 [BAPCD{Sm(BTSA) ₂ } ₂] (24)	81
6 Summary	82
6 Zusammenfassung	85
7 References	88
8 Appendix	95
8.1 Preliminary Results	95
8.1.1 Synthesis	95
8.1.2 Structure	97
8.2 Directory of abbreviations	100
8.3 NMR abbreviations	101
8.4 IR abbreviations	101
8.5 Directory of compounds	101
9 Acknowledgements	103
10 Curriculum Vitae	105
11 Publications	106