

TABLE OF CONTENTS

1. INTRODUCTION	1
1.1 Progress in photoredox catalysis	1
1.2 General visible-light-catalyst.....	2
1.3 Mechanism of photoredox catalysis	3
1.4 Electron donor-acceptor (EDA) complexes concept.....	7
1.5 Advances in C-Se bond formation research in photochemistry	11
1.6 Advances in arene C-B bond formation research in photochemistry.....	18
2. PHOTOCHEMICAL SYNTHESIS OF SELENIDES	24
2.1 Introduction	24
2.2 Results and discussion	26
2.2.1 Initial study and hypothesis	26
2.2.2 Reaction optimization	28
2.2.3 Scope of the photochemical synthesis of seleno-compounds	31
2.2.4 Scope of the photochemical synthesis of chiral α -selenoamino acids	35
2.2.5 Scale up photoinduced selenation.....	36
2.3 Reaction mechanism study	36
2.3.1 Deuterium experiment	36
2.3.2 Control experiment	37
2.3.3 Radical clock experiment.....	38
2.3.4 Time course experiment.....	39
2.4 Conclusion	42
3. PHOTOINDUCED DETHIOPHENATIVE BORYLATION OF AROMATIC RINGS	43
3.1 Introduction	43
3.2 Result and discussion	47
3.2.1 Initial study and hypothesis	47
3.2.2 Reaction optimization	48
3.2.3 Scope of the photoinduced borylation reaction	50

3.3 Reaction mechanism study.....	52
3.3.1 UV-Vis absorption.....	52
3.3.2 Radical clock experiment	53
3.3.3 Proposed reaction pathway.....	54
3.4 Outlook.....	56
3.5 Conclusion.....	57
4. SUMMARY	58
5. EXPERIMENTAL DATA	60
5.1 General information	60
5.2 Experimental data.....	61
5.2.1 Photochemical synthesis of selenides.....	61
5.2.2 Photoinduced borylation of aromatic rings	103
6. ABBREVIATIONS	118
7. REFERENCES.....	120