## General Introduction

### Chapter 1 Application of α-oxoketene dithioacetals in organic synthesis

1.1 Introduction 3

1.2. Heterocycles Syntheses 5

1.2.1 Five membered Rings 5

1.2.1.1 Pyrroles 5

1.2.1.2 Modified Indoles 6

1.2.1.3 Pyrazoles 8

1.2.1.4 Indazoles 9

1.2.1.5 Furans 9

1.2.1.6 Thiophenes 11

1.2.2 Six Membered Rings 13

1.2.2.1 Pyridine 13

1.2.2.2 Pyridinones 14

1.2.2.3 Pyrimidine 17

1.2.2.4 Quinolines 18

1.2.2.5 Pyranones 20

1.2.2.6 Thiopyran 21

1.2.3 Heterocyclic annulations 21

1.2.4 Benzoannulations 24

1.2.5 Carbocycles 25
1.2.6 Aromatic Compounds
1.2.7 Functional group interconversions (FGI)
1.2.7.1 Iodination
1.2.7.2 Baylis-Hilman reaction
1.2.7.3 Aldol condensations
1.2.7.4 Thioamides
1.2.7.5 Thio β-ketoesters
1.2.7.6 S,N and N,N-acetals
1.2.7.7 Enaminones
1.2.8 Application of OKDTAs as reagents
1.2.9 Application of OKDTAs in material science
1.3 Conclusion
1.4 References

Chapter 2 Synthesis of a combinatorial library of 3-aroylcoumarins

2.1 Introduction
2.2 Review on synthesis of coumarins
2.2.1 Pechmann condensation
2.2.2 Knoevenagel condensation
2.2.3 Perkins condensation
2.2.4 Electrophilic aromatic substitution followed by lactonization
2.2.5 Coupling reactions
2.2.6 Grubbs olefinic-metathesis
2.3 Results and discussion
2.3.1 Synthesis and characterization of 3-aroylcoumarins 64a-i from AKDTAs 62a-c
2.3.2 Synthesis and characterization of
3-aroylcoumarins 65a-c from AKDTAs 62a-c

2.3.3. Synthesis of 3-aroylcoumarins 67, 69 & 71 from AKDTAs 66, 68 & 70 with the 2-hydroxybenzaldehydes (salicylaldehyde) 12a

2.3.4 Synthesis of 3-η⁵-ferrocenoyl-2H-2-chromenone 74 from AKDTAs 73 with 2-hydroxybenzaldehyde 12a

2.3.5 Mechanism for the formation of 3-aroylcoumarins

2.3.6 Chalcones from AKDTAs 62a-c and 2-hydroxybenzaldehyde 12a

2.3.7 Reaction of bis-2-hydroxybenzaldehyde 76 with AKDTA 62

2.3.8 Reaction of 2-hydroxybenzaldehyde 12a with oxoketene-N,S acetals

2.4 Conclusion

2.5 Experimental Section

2.6 References

Chapter 3 Synthesis of 4-aroyl-3-methylsulfanyl-2-tosylpyrroles and their subsequent transformation to triarylmethanes

3.1 Introduction

3.2 Review on pyrrole synthesis

3.2 Results and Discussion

3.2.1 Cycloaddition of TosMIC 46 to AKDTAs 45 provides 2,3,4-trisubstituted pyrroles 47 and imidazole 48

3.2.2 Base induced dimerization of TosMIC to furnish imidazole 48

3.2.3 Plausible mechanism
3.2.4 Synthesis of AKDTA 45 and its further transformation to pyrenoylpyrrole 52

3.2.5 Regio-selectivity in the reaction of TosMIC with (4E)-1,1-di(methylsulfanyl)-5-phenyl-1,4-pentadien-3-one 8 126

3.2.6 Competition Experiments 129

3.2.7 Facile Synthesis of Triarylmethanes from trisubstituted pyrrole 47b 130

3.3 Conclusion 139

3.4 Experimental Section 140

3.5 References 153

Chapter 4 Facile synthesis of nitroacetic acid triaryl methyl ortho esters from 1,1-di(methylsulfanyl)-2-nitroethylene

4.1 Introduction 156

4.2 Results and Discussion 159

4.2.1 Synthesis of heteroaryl orthoesters 163

4.2.2 Reaction of nitroketene dithioacetal with nucleophilic and non-nucleophilic bases 170

4.3 Conclusion 171

4.4 Experimental section 172

4.5 References 177

SUMMARY 181

LIST OF PUBLICATIONS 190