



TABLE OF CONTENTS

| | |
|--|-----|
| 1. Introduction..... | 1 |
| 2. Histidine-based artificial amino acids for the modification of metal binding sites in biomolecules..... | 3 |
| 2.1. Zinc finger domains: Structure and function | 3 |
| 2.2. Design principles and application of zinc sensors..... | 8 |
| 2.3. Synthesis of histidine-mimicking single amino acid chelates | 12 |
| 2.4. Development of a Zif268-based zinc sensor | 18 |
| 3. Difluorinated fatty acids..... | 28 |
| 3.1. Lipoxygenases – stereo and regio-controlled oxygenation of polyunsaturated fatty acid | 28 |
| 3.2. Synthesis of difluorinated fatty acids..... | 32 |
| 4. Development of a new auxiliary-mediated ligation strategy..... | 40 |
| 4.1. Native Chemical Ligation..... | 40 |
| 4.2. Auxiliary-based ligation methods | 48 |
| 4.3. Synthesis of a new ligation auxiliary | 54 |
| 4.4. Ligation experiments..... | 65 |
| 5. Summary..... | 79 |
| 6. Experimental part..... | 81 |
| 6.1. Materials and general methods..... | 81 |
| 6.2. Solid Phase Peptide Synthesis..... | 85 |
| 6.3. Histidine-based artificial amino acids | 88 |
| 6.4. Synthesis of Zif268-based zinc sensors..... | 100 |
| 6.5. Difluorinated fatty acids..... | 104 |
| 6.6. Development of a novel NCL strategy based on a photocleavable auxiliary ... | 126 |
| Abbreviations..... | 171 |
| References | 173 |
| Acknowledgement..... | 184 |