

Content

1	Introduction	1
1.1	Transition metal catalyzed cross-coupling reactions	1
1.2	Photoredox catalysis	2
2	Photoredox/transition metal dual catalyzed reductive transformations	7
2.1	Photoredox/nickel dual catalyzed reductive cross-coupling of aryl halides using an organic reducing agent	7
2.1.1	Reductive cross-coupling reaction	7
2.1.2	Dual strategies in visible light-photoredox catalysis for C-C bond formation	8
2.1.3	Photocatalytic transformation of polyfluorinated arenes	9
2.1.4	Aim of the project	9
2.1.5	Results and discussion	10
2.2	Reductive hydrodefunctionalization by Pd/photoredox dual catalysis	17
2.2.1	Direct reduction of aryl halides by photoredox catalysis	17
2.2.2	Reductive palladium/electro dual catalysis	19
2.2.3	Aim of the project	19
2.2.4	Results and discussion	20
2.3	Summary and future work ideas	24
3	Photoredox-catalyzed reductive transformation of perfluoroalkyl compounds	25
3.1	Reductive transformation of perfluoroalkyl compounds	25
3.2	Aim of the project	27
3.3	Results and discussion	27
3.4	Summary and future work ideas	39
4	Reductive transformations of C-C double bonds	41
4.1	Reduction of olefins	41
4.2	Flavin/acridine photocatalysis	43
4.3	Acridine orange catalyzed reductive transformations of C-C bonds	44
4.3.1	Aim of the project	44
4.3.2	Results and discussion	45

4.3.3	Summary and future work ideas.....	55
5	Summary.....	56
6	Experimental section	58
6.1	Materials and methods	68
6.2	General procedures.....	60
6.2.1	General procedure for reductive cross-coupling (GP1).....	60
6.2.2	General procedure for synthesis of aryl triflates 15 (GP2).....	60
6.2.3	General procedure for reductive hydrodefunctionalization (GP3)	61
6.2.4	General procedure for synthesis of perfluoroalkyl substituted arenes (GP4)	61
6.2.5	General procedure for reduction of nonafluorobutyl substituted arenes (GP5) ...	62
6.2.6	General procedure for hydrodimerization of olefins (GP6).....	62
6.2.7	General procedure for monohydrogenation of polycyclic arenes (GP7).....	63
6.3	Analytical data	63
6.3.1	Reductive cross-coupling of aryl halides	63
6.3.2	Hydrodefunctionalization of aryl triflates.....	73
6.3.3	Reduction of perfluoroalkyl substituted arenes	78
6.3.4	Reductive transformation of C-C double bonds	82
7	List of abbreviations.....	86
8	Literature	89