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## **Artificial metallo-proteins for photocatalytic water splitting: stability and activity in artificial photosynthesis**

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# Artificial metallo-proteins for photocatalytic water splitting

*Stability and activity in artificial photosynthesis*

**Laura Opdam**

# **Artificial metallo-proteins for photocatalytic water splitting**

*Stability and activity in artificial photosynthesis*

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**Artificial metallo-proteins for photocatalytic water splitting**

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# Table of Contents

List of abbreviations.....	8
Chapter 1 Introduction .....	13
1    Water splitting.....	14
2    Water oxidation in nature (PSII).....	14
3    H <sup>+</sup> /H <sub>2</sub> conversion in nature.....	16
4    Artificial photosynthesis .....	20
5    Artificial metalloenzymes .....	24
6    ArMs used for solar energy conversion.....	26
7    Water splitting with ArMs .....	28
8    Electron transfer in proteins .....	29
9    Protein stability under oxidative or reductive stress .....	33
10   Metalloprotein scaffolds employed in this thesis .....	33
10.1  Myoglobin (Mb).....	34
10.2  Cytochrome <i>b</i> <sub>5</sub> (CB5) .....	34
10.3  Haem acquisition system A from <i>Pseudomonas aeruginosa</i> (HasAp) .....	35
11   Catalyst and photosensitizer complexes employed in this thesis	36
11.1  WO catalysts.....	37
11.2  Photosensitizers .....	40
11.3  Dihydrogen evolution catalysts.....	40
12   Artificial photosynthesis or photocatalysis .....	41
13   Scope of this thesis.....	43
14   References.....	44
Chapter 2 A screening method for binding synthetic metallo-complexes to haem proteins .....	63
Abstract .....	64

1	Introduction.....	64
2	Materials and Methods .....	66
2.1	Synthesis and purification of complexes.....	66
2.2	Protein expression and purification .....	67
2.3	Preparation of <i>apoprotein</i> and binding of the complexes .....	69
3	Results .....	71
3.1	Comparison of denaturing, semi-native and native PAGE for detecting protein catalyst interaction.....	71
3.2	Effect of pH.....	73
3.3	Electrospray ionization mass spectrometry (ESI-MS).....	75
3.4	Comparing first- and second-row transition metal complex binding.....	80
4	Discussion .....	83
5	Conclusion .....	86
6	Supporting information.....	87
7	References.....	94
Chapter 3 An artificial metalloenzyme that can oxidize water photocatalytically: design, synthesis, and characterization.....		99
Abstract .....		100
1	INTRODUCTION .....	100
2	RESULTS.....	103
2.1	Preparation and binding stoichiometries.....	103
2.2	Spectroscopic characterization .....	103
2.3	Binding location and oxidation state of CoSalen bound to CB5 109	
2.4	Water oxidation photoactivity of CB5:CoSalen samples.....	113
2.5	Nanoparticle formation and ligand release.....	115
2.6	Stability of the CB5:CoSalen in the presence of a photosensitizer (PS) and sacrificial electron acceptor (SA).....	118

2.7	Protein association with a breakdown product of the photosensitizer .....	123
3	DISCUSSION .....	125
4	CONCLUSION .....	129
5	References .....	129
6	Supporting information .....	139
6.1	Supplementary A: Materials.....	139
6.2	Supplementary B: Methods and techniques.....	139
6.3	Supplementary C: Supplementary tables.....	147
6.4	Supplementary D: Supplementary figures .....	151
6.5	References .....	165
Chapter 4 Design and characterization of an artificial metalloenzyme-based dihydrogen evolution system.....		167
Abstract .....		168
1	Introduction.....	169
2	Results .....	174
2.1	Characterization of the ArMs .....	174
2.2	Photoreduction of $MV^{2+}$ by ArM1 and ArM2 .....	186
2.3	Dihydrogen evolution activity .....	189
2.4	Photostability of the ArMs .....	194
3	Discussion .....	202
4	Conclusion .....	205
5	References.....	205
6	Supporting information .....	210
6.1	Materials.....	210
6.2	Methods .....	210
6.3	References.....	215
6.4	Supplementary Tables.....	217

6.5	Supplementary Figures.....	224
Chapter 5	Electron transfer from a Ru(bpy) <sub>3</sub> <sup>-</sup> derived photosensitizer to haem in four mutants of cytochrome <i>b</i> <sub>5</sub> .....	255
	<i>The impact of the mutation site</i> .....	255
	Abstract .....	256
1	Introduction.....	256
2	Results .....	259
2.1	Selected mutation sites and their structural impact on CB5 .	259
2.2	Protein dimerization.....	260
2.3	Haem binding and secondary structure .....	261
2.4	Electron transfer between RuPS and haem .....	262
3	Discussion .....	267
4	Conclusion and outlook.....	271
5	References.....	273
6	Supporting Information.....	277
6.1	Materials and methods .....	277
6.1.1	Protein expression and purification: .....	277
	Protein.....	277
6.1.2	Site directed mutagenesis .....	277
6.1.4	Reaction of CB5 mutants with.....	278
6.1.5	Circular Dichroism (CD) .....	279
6.1.6	Steady state fluorescence .....	279
6.1.8	UV-vis absorption .....	280
6.1.9	Homology models.....	280
6.1.10	ESI-MS.....	280
6.2	References .....	281
6.3	Supplementary Tables.....	283
6.4	Supplementary Figures.....	289



Chapter 6 General discussion and outlook .....	301
1 Selection and screening.....	302
2 Catalysis in and stability of an artificial metalloenzyme (ArM) .....	303
3 Recommendations for ArMs with WO and HE activity .....	304
4 References.....	306
Summary .....	308
Samenvatting.....	313
Curriculum vitae .....	318
List of publications.....	320

# LIST OF ABBREVIATIONS

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ArM	Artificial metalloenzyme
BCA kit	Bicinchoninic acid kit
bpy	bipyridine
CB5	Cytochrome <i>b</i> <sub>5</sub>
CD	Circular dichroism
Co1	CoSalen where H <sub>2</sub> Salen = N,N'-bis(salicylidene)ethylenediamine
Co2	CoPhthalocyanine
Co3	[Co(II)( 2,2':6',2'':6'',2''':6'''-quaterpyridine)(Cl) <sub>2</sub> ]
Co4	[Co(II)( 2,2':6',2'':6'',2''':6'''-quaterpyridine)(H <sub>2</sub> O) <sub>2</sub> ](ClO <sub>4</sub> ) <sub>2</sub>
CP43	Chlorophyll containing protein 43
CP47	Chlorophyll containing protein 47
Cyt <i>b</i> <sub>6f</sub>	Cytochrome <i>b</i> <sub>6f</sub>
DLS	Dynamic light scattering
ECC	E = one-electron reduction, C = chemical protonation
<i>E. coli</i>	<i>Escherichia coli</i>
EDTA	Ethylenediaminetetraacetic acid
<i>E</i> <sub>m</sub>	Midpoint potential
EPR	Electron paramagnetic resonance
ER	Electron relay
ESI-MS	Electrospray ionization mass spectrometry
ET	Electron transfer
FNR	Ferredoxin
HasAp	Haem acquisition system A <i>Pseudomonas aeruginosa</i>
HE	Dihydrogen evolution
HEC	Dihydrogen evolution catalyst
HR-MS	High-resolution mass spectrometry
I2M	Interaction of two metal species
IC	Internal conversion
ICP-MS	Inductively coupled plasma mass spectrometry
IPTG	Isopropyl β-D-1-thiogalactopyranoside
ISC	Intersystem crossing
LC-MS	Liquid chromatography mass spectrometry
LED	Light emitting diode
LHC	Light-Harvesting complex
LHCSR	Light-Harvesting Complex Stress-Related

LSW HSQC coherence	Large spectral window heteronuclear single quantum
Mb	Myoglobin
MC	Metal centred
MLCT	Metal to ligand charge transfer
MV	Methyl viologen
MWCO	Molecular weight cut-off
NanoDSF	Nano differential scanning fluorimetry
NaPi	Sodium phosphate
NMR	Nuclear magnetic resonance
NPQ	Non-photochemical quenching
Pheo	Pheophytin
PMSF	Phenylmethylsulphonyl fluoride
PPIX	Protoporphyrin IX
PQ	Plastoquinone
PS	Photosensitizer
Psb	Photosystem II subunit
PSI	Photosystem I
PSII	Photosystem II
qE	Energy quenching
rHSA	recombinant Human Serum Albumin
ROS	Reactive oxygen species
Ru1	[2,2':6',2''-terpyridine]-6,6''-dicarboxylate
Ru2	Ru(1,2-bis(pyridine-2-carboxamido)-4,5-dimethylbenzene(2-))(CO)(OH <sub>2</sub> )
Ru3	[Ru(II)( 2,2':6',2'':6'',2'''-quaterpyridine)(Cl) <sub>2</sub> ]
RuPS dione)] <sup>2+</sup>	[Ru(bpy) <sub>2</sub> (1-(1,10-phenanthrolin-5-yl)-1H-pyrrole-2,5-
SA	Sacrificial acceptor
SD	Sacrificial donor
sDev	Standard deviation
SR	Sacrificial reagent
SDS-PAGE	Sodium dodecyl sulphate polyacrylamide gel electrophoresis
SEC-MALS	Size exclusion chromatography multi-angle light scattering
SN	Semi-native
TCEP	Tris(2-carboxyethyl)phosphine
TEOA	Triethanolamine
T <sub>i</sub>	Infliction temperature
TOF	Turn over frequency
TON	Turn over number

WHOPS	WholePlasmid synthesis
WNA	Water nucleophilic attack
WO	Water oxidation
WOC	Water oxidation catalyst
WT	Wild type

