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Towards photo-CIDNP MAS NMR as a generally applicable enhancement method

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Towards Photo-CIDNP MAS NMR as a Generally Applicable Enhancement Method

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To my Parents

CONTENTS

<i>List of Abbreviations.....</i>	<i>9</i>
<i>Chapter 1: Introduction.....</i>	<i>11</i>
<i>Chapter 2: Whole-cell NMR characterization of two photochemically active states of the photosynthetic reaction center in heliobacteria.....</i>	<i>27</i>
<i>Chapter 3: Electron spin density distribution in the special pair triplet of Rhodobacter sphaeroides R26 revealed by the magnetic field dependence of the solid-state photo-CIDNP effect.....</i>	<i>69</i>
<i>Chapter 4: Solid-state photo-CIDNP effect observed in phototropin LOV1-C57S by ¹³C magic-angle spinning NMR spectroscopy.....</i>	<i>101</i>
<i>Chapter 5: Magnetic field dependence of the solid-state ¹³C photo-CIDNP effect in phototropin LOV1-C57S.....</i>	<i>113</i>
<i>Chapter 6: General discussion.....</i>	<i>123</i>
<i>Summary.....</i>	<i>127</i>
<i>Samenvatting.....</i>	<i>129</i>
<i>List of publications.....</i>	<i>133</i>
<i>Curriculum Vitae.....</i>	<i>135</i>

LIST OF ABBREVIATIONS

ALA	δ -aminolevulinic acid
BChl	Bacteriochlorophyll
BPheo	Bacteriopheophytin
Car	Carotenoid
DD	Differential decay
DDG	Digital delay generator
DFT	Density functional theory
DNP	Dynamic nuclear polarization
DR	Differential relaxation
EPR	Electron paramagnetic resonance
ENDOR	Electron nuclear double resonance
FMN	Flavin mononucleotide
<i>Hb.</i>	<i>Heliobacillus</i>
hfi	Hyperfine interaction
ISC	Intersystem crossing
LOV	Light-, oxygen- or voltage- sensitive
MAS	Magic-angle spinning
n.a.	Natural abundance
ns	Nanosecond
NMR	Nuclear magnetic resonance
OPO	Optical parametric oscillator
P	Special pair formed by two Bacteriochlorophyll <i>a</i>
P _M	Bacteriochlorophyll <i>a</i> of P attached to the M branch of the RC
P _L	Bacteriochlorophyll <i>a</i> of P attached to the L branch of the RC
PSI	Photosystem I
PSII	Photosystem II
Photo-CIDNP	Photochemically induced dynamic nuclear polarization
<i>Rb.</i>	<i>Rhodobacter</i>
RC	Reaction center
RPM	Radical pair mechanism
TPPM	Two-pulse phase modulation
Trp	Tryptophan
TSM	Three-spin mixing
WT	Wild type
ϕ	Bacteriopheophytin of L branch. First electron acceptor

LIST OF SYMBOLS

a_{iso}	isotropic hyperfine interaction
A_{zz}	(3,3) element of hyperfine tensor
$A_{\text{zx}}, A_{\text{zy}}$	Pseudosecular elements of hyperfine interaction
B	Pseudosecular hyperfine interaction
D	Magnitude of electron –electron dipolar coupling

d	Electron-electron coupling
d'	Electron-electron dipolar coupling
H_{S-T_0}	Hamiltonian operator for the S- T_0 intersystem crossing
I	Nuclear spin operator
J	Electron-electron exchange coupling
S	Singlet radical state
S	Electron spin operator
S'	Fictitious electron spin operator
T	Triplet excited state of the donor
T_s	Spin temperature
T_s	Lifetime of the singlet radical state
T_T	Lifetime of the triplet radical state
T_{-1}	Triplet state with magnetic quantum number -1
T_0	Triplet state with magnetic quantum number 0
T_{+1}	Triplet state with magnetic quantum number +1
T_1	Longitudinal nuclear relaxation time
T_2	Transverse nuclear relaxation time
δ	Error of the flip angle of a $\pi/2$ magnetic pulse
ΔA	Hyperfine anisotropy
$\Delta\Omega$	Difference of the electron Zeeman interaction between the two radicals
ω_I	Nuclear Zeeman interaction