



Universiteit
Leiden
The Netherlands

Dynamics in photosynthetic transient complexes studied by paramagnetic NMR spectroscopy

Scanu, S.

Citation

Scanu, S. (2013, October 10). *Dynamics in photosynthetic transient complexes studied by paramagnetic NMR spectroscopy*. Retrieved from <https://hdl.handle.net/1887/21915>

Version: Not Applicable (or Unknown)

License: [Leiden University Non-exclusive license](#)

Downloaded from: <https://hdl.handle.net/1887/21915>

Note: To cite this publication please use the final published version (if applicable).

Cover Page



Universiteit Leiden



The handle <http://hdl.handle.net/1887/21915> holds various files of this Leiden University dissertation.

Author: Scanu, Sandra

Title: Dynamics in photosynthetic transient complexes studied by paramagnetic NMR spectroscopy

Issue Date: 2013-10-10

**Dynamics in photosynthetic transient complexes
studied by paramagnetic NMR spectroscopy**

Sandra Scanu

Dynamics in photosynthetic transient complexes
studied by paramagnetic NMR spectroscopy

Sandra Scanu

Doctoral Thesis, Leiden University, 2013

ISBN number: 978-94-6203-444-0

© 2013, Sandra Scanu

Cover designed by Maddalena Idili: it.linkedin.com/pub/maddalena-idili/40/374/883

Printed by CPI-Wöhrmann Print Service - Zutphen

Dynamics in photosynthetic transient complexes studied by paramagnetic NMR spectroscopy

Proefschrift

ter verkrijging van
de graad van Doctor aan de Universiteit Leiden,
op gezag van Rector Magnificus Prof. mr. C.J.J.M. Stolker,
volgens besluit van het College voor Promoties
te verdedigen op donderdag 10 Oktober 2013
klokke 15.00 uur

door

Sandra Scanu

Geboren te Sardinië, Italië
in 1981

Promotiecommissie

Promotor: Prof. Dr. M. Ubbink

Overige leden: Prof. Dr. R. Boelens (Universiteit Utrecht)
Prof. Dr. J. Brouwer
Dr. I. Díaz-Moreno (Universidad de Sevilla)
Prof. Dr. E. J. J. Groenen
Prof. Dr. G. M. Ullmann (Universität Bayreuth)

The investigations described in this thesis were performed at the Protein Chemistry department of the Leiden Institute of Chemistry, Leiden University, Leiden, the Netherlands.

Financial support for the research was provided by the Netherlands Organisation for Scientific research (NWO), Chemical Sciences ECHO grant 700.57.011.

***dedicated to my beloved sister
who always encourages me
to follow my aspirations***

Contents

Abbreviations	7
Chapter I Introduction	11
Chapter II The complex of cytochrome <i>f</i> and plastocyanin from <i>Nostoc</i> sp. PCC 7119 is highly dynamic	25
Chapter III Role of hydrophobic interactions in the encounter complex formation of plastocyanin and cytochrome <i>f</i> complex revealed by paramagnetic NMR spectroscopy	39
Chapter IV Loss of electrostatic interactions causes increase of dynamics within the plastocyanin-cytochrome <i>f</i> complex	65
Chapter V Concluding remarks	87
Nederlandse Samenvatting	93
English Summary	97
References	101
Appendices	111
List of publications	137
Curriculum vitae	138

Abbreviations

ET	Electron transfer
Pc	Plastocyanin
Cyt <i>f</i>	Cytochrome <i>f</i>
<i>N</i>	<i>Nostoc</i> sp. PCC 7119
<i>Ph</i>	<i>Phormidium laminosum</i>
<i>b₆f</i>	Cytochrome <i>b₆f</i>
PSI	Photosystem I
NMR	Nuclear magnetic resonance
HSQC	Heteronuclear single quantum coherence
CSP	Chemical shift perturbation
PCS	Pseudocontact shift
PRE	Paramagnetic relaxation enhancement
BD	Brownian dynamics
MC	Monte Carlo
MES	2-(<i>N</i> -morpholino) ethanesulfonic acid
MTS	(1-Acetoxy-2,2,5,5-tetramethyl- δ -3-pyrroline-3-methyl) methanethiosulfonate
MTSL	(1-Oxyl-2,2,5,5-tetramethyl- δ -3-pyrroline-3-methyl) methanethiosulfonate
CoM	Center of mass

**“Così tra questa immensità s’annega il pensier mio:
e il naufragar m’è dolce in questo mare.”**

- In such immensity my thinking drowns and it is sweet to shipwreck in this sea-

Giacomo Leopardi, L'infinito, 1818-1819.

