



Universiteit  
Leiden  
The Netherlands

## Transient interactions studied by NMR : iron sulfur proteins and their interaction partners

Xu, X.

### Citation

Xu, X. (2009, January 21). *Transient interactions studied by NMR : iron sulfur proteins and their interaction partners*. Leiden. Retrieved from <https://hdl.handle.net/1887/13428>

Version: Corrected Publisher's Version

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/13428>

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

# Contents

<b>CHAPTER 1</b>	General introduction	<b>7</b>
<b>CHAPTER 2</b>	Dynamics in a pure encounter complex of two proteins studied by solution scattering and paramagnetic NMR spectroscopy	<b>33</b>
<b>CHAPTER 3</b>	Intermolecular dynamics studied by paramagnetic tagging	<b>65</b>
<b>CHAPTER 4</b>	Ferredoxin/ferredoxin-thioredoxin reductase complex: complete NMR mapping of the interaction site on ferredoxin by gallium substitution	<b>85</b>
<b>CHAPTER 5</b>	Solution structure of the Ga-substituted ferredoxin from <i>Synechocystis</i> sp. PCC6803	<b>105</b>
<b>CHAPTER 6</b>	The ternary protein complex of ferredoxin, ferredoxin/thioredoxin reductase, and thioredoxin studied by NMR	<b>119</b>
	Concluding remarks	<b>139</b>
	Summary	<b>143</b>
	Nederlandse samenvatting	<b>147</b>
	List of publications	<b>151</b>
	Curriculum vitae	<b>152</b>
	Acknowledgements	<b>153</b>

## Abbreviations

Adx	adrenodoxin
AdR	adrenodoxin reductase
Cc	cytochrome <i>c</i>
CL	cross-linked
CSP	chemical shift perturbation
$\Delta\delta_{\text{avg}}$	averaged chemical shift perturbation
EPR	Electron paramagnetic resonance
Fd	ferredoxin
FNR	ferredoxin:NADP oxidoreductase
FTR	ferredoxin thioredoxin reductase
GaFd	gallium substituted ferredoxin
GOGAT	glutamate synthase
HSQC	heteronuclear single quantum coherence
IPTG	Isopropyl- $\beta$ -D-thiogalactopyranoside
$K_a$	association constant
$K_d$	dissociation constant
$k_{\text{off}}$	dissociation rate constant
$k_{\text{on}}$	association rate constant
LB	Luria-Bertani medium
MTS	(1-acetyl-2,2,5,5-tetramethyl-3-pyrroline-3-methyl)- methanethiosulfonate
MTSL	(1-oxyl-2,2,5,5-tetramethyl-3-pyrroline-3-methyl)- methanethiosulfonate
NiR	nitrite reductase
NaR	nitrate reductase
NMR	nuclear magnetic resonance
NOE	nuclear Overhauser enhancement
NOESY	nuclear Overhauser enhancement spectroscopy
Pdx	putidaredoxin
PRE	paramagnetic relaxation enhancement
PCS	pseudo contact shift
RDC	residual dipolar coupling
RMSD	root-mean-square deviation
SAXS	small angle X-ray scattering
TOCSY	total correlation spectroscopy
TROSY	transverse relaxation optimized spectroscopy
Trx	thioredoxin