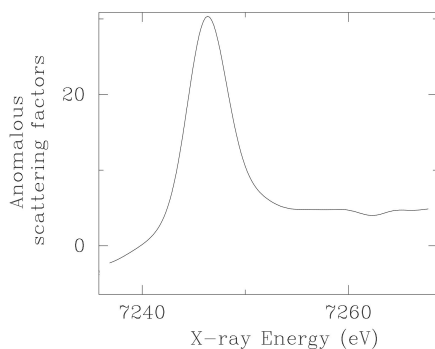


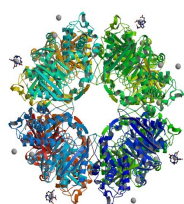
Lanthanide complexes for anomalous phasing

Our new lanthanide complexes are designed for anomalous phasing of protein structures:

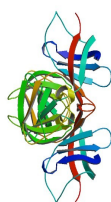
- they **bind to the surface** of macromolecules
- you get a **strong anomalous signal** of the lanthanides in their L_{III} absorption edge or with $CuK\alpha$ radiation from a laboratory X-ray source.



HUGE anomalous signal !!!

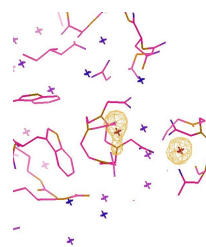


(2qmi)



(2bh8)

Successfully used to solve difficult structures !!!



Phasing, even at room temperature !

Anomalous data of Yb-DO3A / lysozyme complex
(Crystal still "in the drop")

Data collected on BM30A, ESRF

Resolution: 1.8 Å - Completeness (anom.): 90 %
Blue: anomalous difference map (threshold: 6 σ)


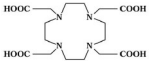
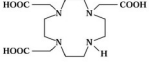

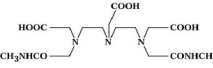


Ready-to-use solubilized complexes

Published work about or using the present lanthanide complexes (more at www.natx-ray.com):

- Talon et al. (2011) Using lanthanoid complexes to phase large macromolecular assemblies. *J. Synchrotron Rad.* 18, 74-78
- Molina et al. (2009) Characterization of gadolinium complexes for SAD phasing in macromolecular crystallography: application to CbpF. *Acta Crystallographica Section D Biological Crystallography*, 65, 823-831.
- Delfosse et al. (2009) Structure of the archaeal pab87 peptidase reveals a novel self-compartmentalizing protease family. *PLoS One*, 4, e4712.
- Molina et al. (2009) Crystal structure of CbpF, a bifunctional choline-binding protein and autolysis regulator from *Streptococcus pneumoniae*. *EMBO Reports*, 10, 246-251.
- Pompidor et al. (2008) Protein crystallography through supramolecular interactions between a lanthanide complex and arginine. *Angewandte Chemie International Edition*, 47, 3388-3391.
- Molina et al. (2007) Crystallization and preliminary X-ray diffraction studies of choline-binding protein F from *Streptococcus pneumoniae*. *Acta Crystallographica Section F Structural Biology and Crystallization Communications*, 63, 742-745.
- Jeudy et al. (2005) Preliminary crystallographic analysis of the *Escherichia coli* YeaZ protein using the anomalous signal of a gadolinium derivative. *Acta Crystallographica Section F Structural Biology and Crystallization Communications*, 61, 848-851.
- Lagartera et al. (2005) Crystallization and preliminary X-ray diffraction studies of the pneumococcal teichoic acid phosphorylcholine esterase Pce. *Acta Crystallographica Section F Structural Biology and Crystallization Communications*, 60, 1506-1508.
- de Bono et al. (2005) A segment of cold shock protein directs the folding of a combinatorial protein. *Proc Natl Acad Sci U S A*, 102, 1396-1401.
- Girard et al. (2004) Heavy-atom derivatives in lipidic cubic phases: results on hen egg-white lysozyme tetragonal derivative crystals with Gd-HPDO3A complex. *Acta Crystallographica Section D Biological Crystallography*, 60, 1506-1508.
- Girard et al. (2003) A new class of lanthanide complexes to obtain high-phasing-power heavy-atom derivatives for macromolecular crystallography. *Acta Crystallographica Section D Biological Crystallography*, 59, 1914-1922.
- Girard et al. (2003) High-phasing-power lanthanide derivatives: taking advantage of ytterbium and lutetium for optimized anomalous diffraction experiments using synchrotron radiation. *Acta Crystallographica Section D Biological Crystallography*, 59, 1877-1880.
- Girard et al. (2003) A new class of gadolinium complexes employed to obtain high-phasing-power heavy-atom derivatives: results from SAD experiments with hen egg-white lysozyme and urate oxidase from *Aspergillus flavus*. *Acta Crystallographica Section D Biological Crystallography*, 59, 118-126.
- Girard et al. (2002) Gd-HPDO3A, a complex to obtain high-phasing-power heavy-atom derivatives for SAD and MAD experiments: results with tetragonal hen egg-white lysozyme. *Acta Crystallographica Section D Biological Crystallography*, 58, 1-9.

Five different chelators are available:

Acronym	Name	Formula
(DPA) ₃	tris(pyridine-2,6-dicarboxylate) or tris(dipicolinate)	
DOTA	1,4,7,10-tetraazacyclododecan-1,4,7,10-tetraacetic acid (CAS # 60239-18-1)	
DO3A	1,4,7,10-tetraazacyclododecan-1,4,7-triacetic acid	
HPDO3A	10-(2-hydroxypropyl)-1,4,7,10-tetraazacyclododecan-1,4,7-triacetic acid	
DTPA-BMA	N,N-bis[2-[(carboxymethyl) [(methylcarbamoyl)methyl]amino]ethyl]glycine	

Possible lanthanide atoms are:

Atom	LIII edge	f'' at L _{III} edge (e-)	f'' at 1.0 Å (e-)	f'' at 1.54 Å (e-)
Eu	1.7761 Å / 6980 eV	28-30	6.52	11.26
Yb	1.3862 Å / 8944 eV	28-30	9.69	4.43
Gd	1.7117 Å / 7242.9 eV	28-30	6.92	11.98

The lanthanide-chelator complexes are available in the following combinations:

Product reference	Color code	Chelator	Lanthanide atom	Complex charge	Concentration (mM)	Volume (μL)
CSM002-0001A	1	(DPA) ₃	Eu	-3	200	500
	2		Yb	-3	200	500
	3	DOTA	Eu	-1	500	100
	4		Yb	-1	500	100
	5	DO3A	Eu	0	500	100
	6		Yb	0	500	100
	7	HPDO3A	Eu	0	500	100
	8		Yb	0	500	100
	9	DTPA-BMA	Eu	0	500	100
	10		Yb	0	500	100
CSM002-0101A	1	(DPA) ₃	Eu	-3	200	1000
CSM002-0102A	2	(DPA) ₃	Yb	-3	200	1000
CSM002-0103A	3	DOTA	Eu	-1	500	200
CSM002-0104A	4	DOTA	Yb	-1	500	200
CSM002-0105A	5	DO3A	Eu	0	500	200
CSM002-0106A	6	DO3A	Yb	0	500	200
CSM002-0107A	7	HPDO3A	Eu	0	500	200
CSM002-0108A	8	HPDO3A	Yb	0	500	200
CSM002-0109A	9	DTPA-BMA	Eu	0	500	200
CSM002-0110A	10	DTPA-BMA	Yb	0	500	200
CSM002-0002A	•	HPDO3A	Gd	0	500	100