



# Full wwPDB X-ray Structure Validation Report ⓘ

Oct 14, 2025 – 12:10 PM JST

PDB ID : 8YFP / pdb\_00008yfp  
Title : Chito oligosaccharide deacetylase from vibrio campbellii (VhCOD)  
Authors : Sirikan, P.; Tamo, F.; Robinson, R.C.; Wipa, S.  
Deposited on : 2024-02-25  
Resolution : 2.45 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity	:	4-5-2 with Phenix2.0
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.46

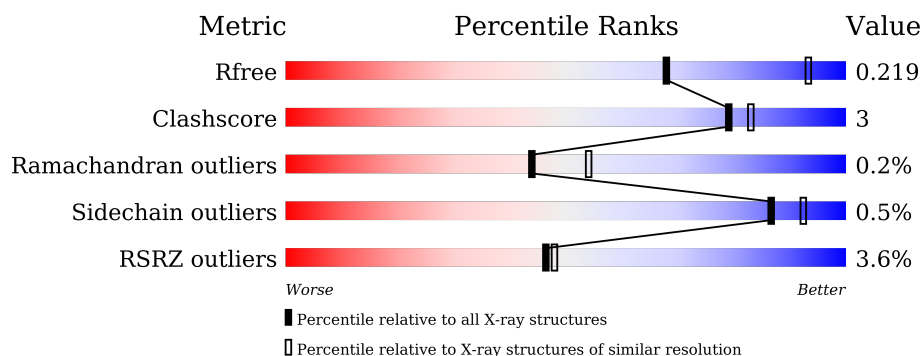
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.45 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	164625	1096 (2.46-2.46)
Clashscore	180529	1178 (2.46-2.46)
Ramachandran outliers	177936	1170 (2.46-2.46)
Sidechain outliers	177891	1170 (2.46-2.46)
RSRZ outliers	164620	1096 (2.46-2.46)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	413	<div> <div>4%</div> <div>88%</div> <div>9%</div> <div>.</div> </div>
1	B	413	<div> <div>3%</div> <div>91%</div> <div>7%</div> <div>.</div> </div>

## 2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 6506 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called NodB homology domain-containing protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	403	Total	C	N	O	S	0	0	0
			3131	1986	520	616	9			
1	B	402	Total	C	N	O	S	0	0	0
			3125	1983	519	614	9			

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	406	SER	-	expression tag	UNP A7MSF4
A	407	ARG	-	expression tag	UNP A7MSF4
A	408	HIS	-	expression tag	UNP A7MSF4
A	409	HIS	-	expression tag	UNP A7MSF4
A	410	HIS	-	expression tag	UNP A7MSF4
A	411	HIS	-	expression tag	UNP A7MSF4
A	412	HIS	-	expression tag	UNP A7MSF4
A	413	HIS	-	expression tag	UNP A7MSF4
B	406	SER	-	expression tag	UNP A7MSF4
B	407	ARG	-	expression tag	UNP A7MSF4
B	408	HIS	-	expression tag	UNP A7MSF4
B	409	HIS	-	expression tag	UNP A7MSF4
B	410	HIS	-	expression tag	UNP A7MSF4
B	411	HIS	-	expression tag	UNP A7MSF4
B	412	HIS	-	expression tag	UNP A7MSF4
B	413	HIS	-	expression tag	UNP A7MSF4

- Molecule 2 is ZINC ION (CCD ID: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Zn	0	0
			1	1		

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	B	1	Total	Zn	0	0
			1	1		

- Molecule 3 is MAGNESIUM ION (CCD ID: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	2	Total	Mg	0	0
			2	2		

- Molecule 4 is CALCIUM ION (CCD ID: CA) (formula: Ca) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Ca	0	0
			1	1		
4	B	2	Total	Ca	0	0
			2	2		

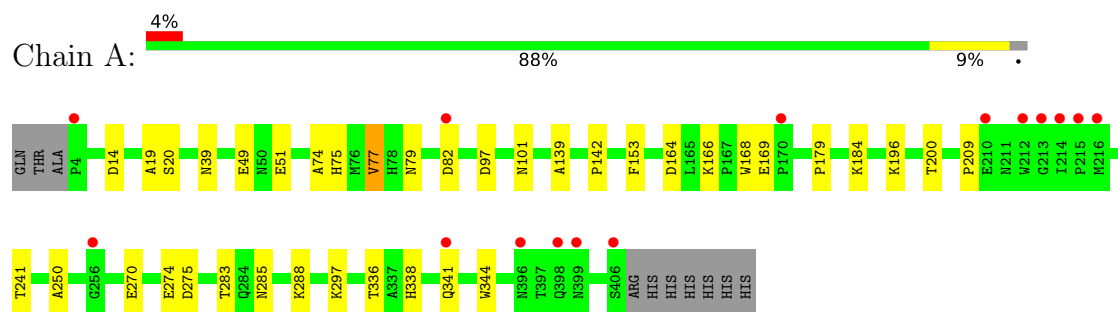
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	117	Total	O	0	0
			117	117		
5	B	126	Total	O	0	0
			126	126		

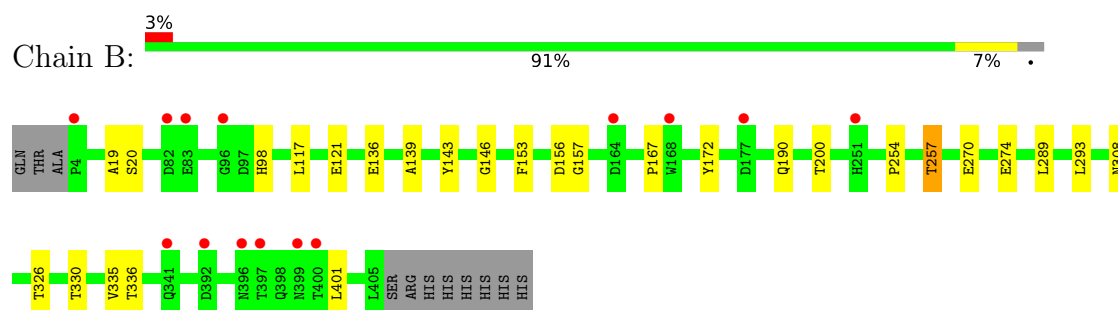
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ( $RSRZ > 2$ ). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

- Molecule 1: NodB homology domain-containing protein



- Molecule 1: NodB homology domain-containing protein



## 4 Data and refinement statistics

Property	Value	Source
Space group	I 21 3	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	209.06Å 209.06Å 209.06Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	19.93 – 2.45 19.93 – 2.45	Depositor EDS
% Data completeness (in resolution range)	99.8 (19.93-2.45) 99.6 (19.93-2.45)	Depositor EDS
$R_{merge}$	0.20	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.02 (at 2.47Å)	Xtriage
Refinement program	PHENIX (1.18.2_3874: ???)	Depositor
R, $R_{free}$	0.195 , 0.219 0.199 , 0.219	Depositor DCC
$R_{free}$ test set	2803 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	38.1	Xtriage
Anisotropy	0.000	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.39 , 41.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	0.016 for -l,-k,-h	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	6506	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	40.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.18% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: MG, ZN, CA

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 5$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z  > 5$	RMSZ	$\# Z  > 5$
1	A	0.37	0/3223	0.57	2/4421 (0.0%)
1	B	0.38	0/3217	0.63	5/4413 (0.1%)
All	All	0.37	0/6440	0.60	7/8834 (0.1%)

There are no bond length outliers.

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	153	PHE	CA-CB-CG	6.65	120.45	113.80
1	B	157	GLY	CA-C-N	-5.78	111.92	122.38
1	B	157	GLY	C-N-CA	-5.78	111.92	122.38
1	A	209	PRO	N-CA-CB	-5.67	98.16	103.27
1	B	401	LEU	CA-C-N	-5.43	113.68	122.81
1	B	401	LEU	C-N-CA	-5.43	113.68	122.81
1	B	156	ASP	CA-CB-CG	5.04	117.64	112.60

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3131	0	2920	18	0
1	B	3125	0	2915	14	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	A	1	0	0	0	0
2	B	1	0	0	0	0
3	A	2	0	0	0	0
4	A	1	0	0	0	0
4	B	2	0	0	0	0
5	A	117	0	0	0	0
5	B	126	0	0	1	0
All	All	6506	0	5835	31	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 3.

All (31) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:275:ASP:OD2	1:A:283:THR:HG23	2.03	0.58
1:A:97:ASP:OD1	1:A:166:LYS:NZ	2.40	0.53
1:B:20:SER:HA	1:B:270:GLU:HG2	1.92	0.50
1:A:341:GLN:HB3	1:A:344:TRP:HD1	1.76	0.49
1:A:179:PRO:O	1:A:184:LYS:HE3	2.14	0.48
1:A:166:LYS:HB2	1:A:169:GLU:HG3	1.96	0.47
1:A:196:LYS:HE3	1:B:121:GLU:OE2	2.15	0.46
1:B:98:HIS:HB3	1:B:143:TYR:OH	2.16	0.46
1:B:335:VAL:HG12	1:B:336:THR:HG23	1.97	0.45
1:B:167:PRO:HA	1:B:172:TYR:CG	2.52	0.45
1:A:285:ASN:HA	1:A:288:LYS:HD2	1.99	0.44
1:A:49:GLU:O	1:A:51:GLU:HG2	2.18	0.44
1:B:254:PRO:HB2	1:B:257:THR:HG23	1.99	0.43
1:A:139:ALA:O	1:A:200:THR:HA	2.19	0.43
1:A:75:HIS:CE1	1:A:142:PRO:HB3	2.53	0.43
1:B:117:LEU:HD13	1:B:136:GLU:HG2	2.01	0.42
1:B:308:ASN:ND2	5:B:603:HOH:O	2.34	0.42
1:B:146:GLY:HA3	1:B:190:GLN:NE2	2.34	0.42
1:A:20:SER:HA	1:A:270:GLU:HG2	2.00	0.42
1:A:14:ASP:HA	1:A:39:ASN:OD1	2.20	0.42
1:B:139:ALA:O	1:B:200:THR:HA	2.19	0.42
1:A:336:THR:O	1:A:338:HIS:HD2	2.03	0.41
1:A:19:ALA:HB2	1:A:274:GLU:HB2	2.02	0.41
1:B:326:THR:HA	1:B:330:THR:O	2.20	0.41
1:A:74:ALA:O	1:A:77:VAL:HG13	2.20	0.41
1:A:166:LYS:HD3	1:A:168:TRP:CZ2	2.56	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:79:ASN:HB3	1:A:101:ASN:O	2.21	0.41
1:B:289:LEU:O	1:B:293:LEU:HG	2.21	0.41
1:A:241:THR:HG22	1:A:250:ALA:O	2.21	0.40
1:B:153:PHE:C	1:B:153:PHE:CD1	2.98	0.40
1:B:19:ALA:HB2	1:B:274:GLU:HB2	2.04	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	401/413 (97%)	390 (97%)	9 (2%)	2 (0%)	25	32
1	B	400/413 (97%)	389 (97%)	11 (3%)	0	100	100
All	All	801/826 (97%)	779 (97%)	20 (2%)	2 (0%)	44	54

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	82	ASP
1	A	164	ASP

### 5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	333/342 (97%)	331 (99%)	2 (1%)	84	91
1	B	332/342 (97%)	331 (100%)	1 (0%)	91	95
All	All	665/684 (97%)	662 (100%)	3 (0%)	86	92

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	77	VAL
1	A	297	LYS
1	B	257	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	98	HIS
1	A	338	HIS
1	B	342	GLN
1	B	390	GLN

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

## 5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

## 5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

## 5.6 Ligand geometry ⓘ

Of 7 ligands modelled in this entry, 7 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data

### 6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	403/413 (97%)	-0.37	15 (3%) 45 47	29, 39, 60, 97	0
1	B	402/413 (97%)	-0.41	14 (3%) 47 49	29, 37, 54, 94	0
All	All	805/826 (97%)	-0.39	29 (3%) 46 48	29, 38, 59, 97	0

All (29) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	406	SER	4.9
1	B	4	PRO	4.1
1	A	341	GLN	4.0
1	B	397	THR	3.6
1	A	215	PRO	3.4
1	A	213	GLY	3.0
1	B	82	ASP	2.9
1	B	396	ASN	2.9
1	B	96	GLY	2.9
1	B	341	GLN	2.8
1	B	400	THR	2.8
1	A	256	GLY	2.8
1	B	399	ASN	2.7
1	A	396	ASN	2.7
1	B	251	HIS	2.6
1	A	214	ILE	2.6
1	A	4	PRO	2.5
1	B	168	TRP	2.5
1	A	210	GLU	2.5
1	A	170	PRO	2.4
1	A	212	TRP	2.4
1	B	177	ASP	2.4
1	A	399	ASN	2.3
1	B	392	ASP	2.3

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Mol	Chain	Res	Type	RSRZ
1	A	216	MET	2.3
1	B	83	GLU	2.3
1	A	82	ASP	2.1
1	B	164	ASP	2.1
1	A	398	GLN	2.1

## 6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

## 6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

## 6.4 Ligands [i](#)

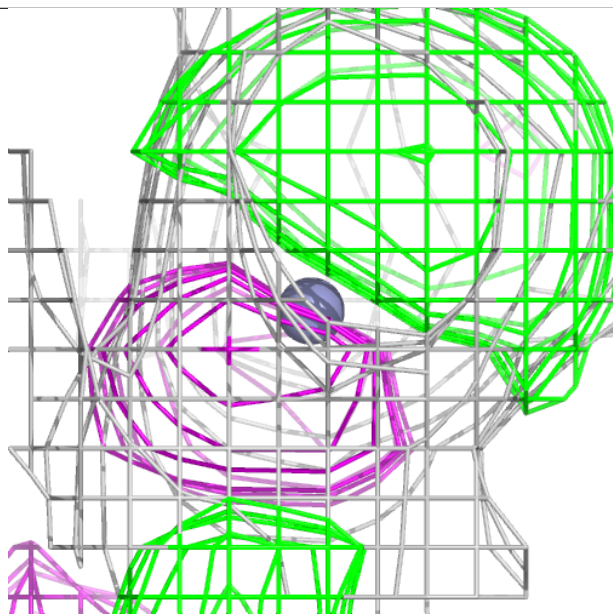
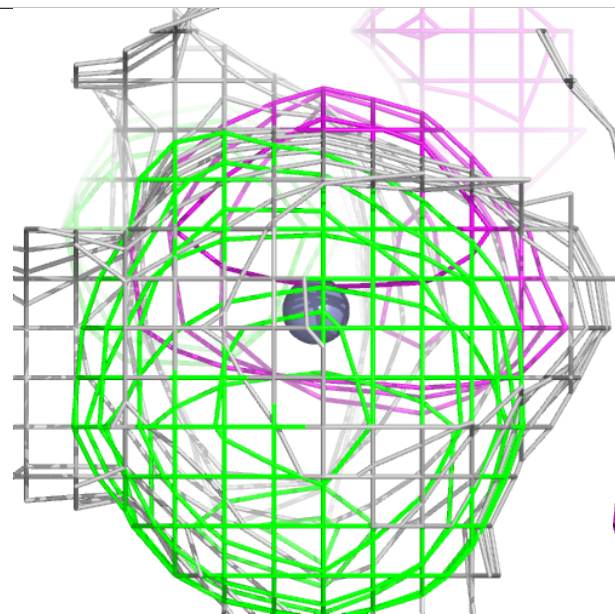
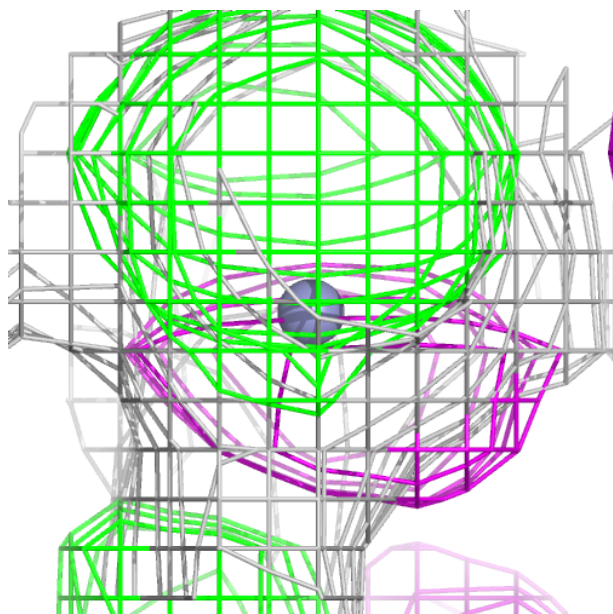
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
2	ZN	B	501	1/1	0.57	0.14	35,35,35,35	0
4	CA	B	502	1/1	0.63	0.16	116,116,116,116	0
2	ZN	A	501	1/1	0.70	0.13	43,43,43,43	0
4	CA	A	504	1/1	0.93	0.06	58,58,58,58	0
3	MG	A	502	1/1	0.96	0.13	41,41,41,41	0
3	MG	A	503	1/1	0.97	0.14	27,27,27,27	0
4	CA	B	503	1/1	0.99	0.02	37,37,37,37	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

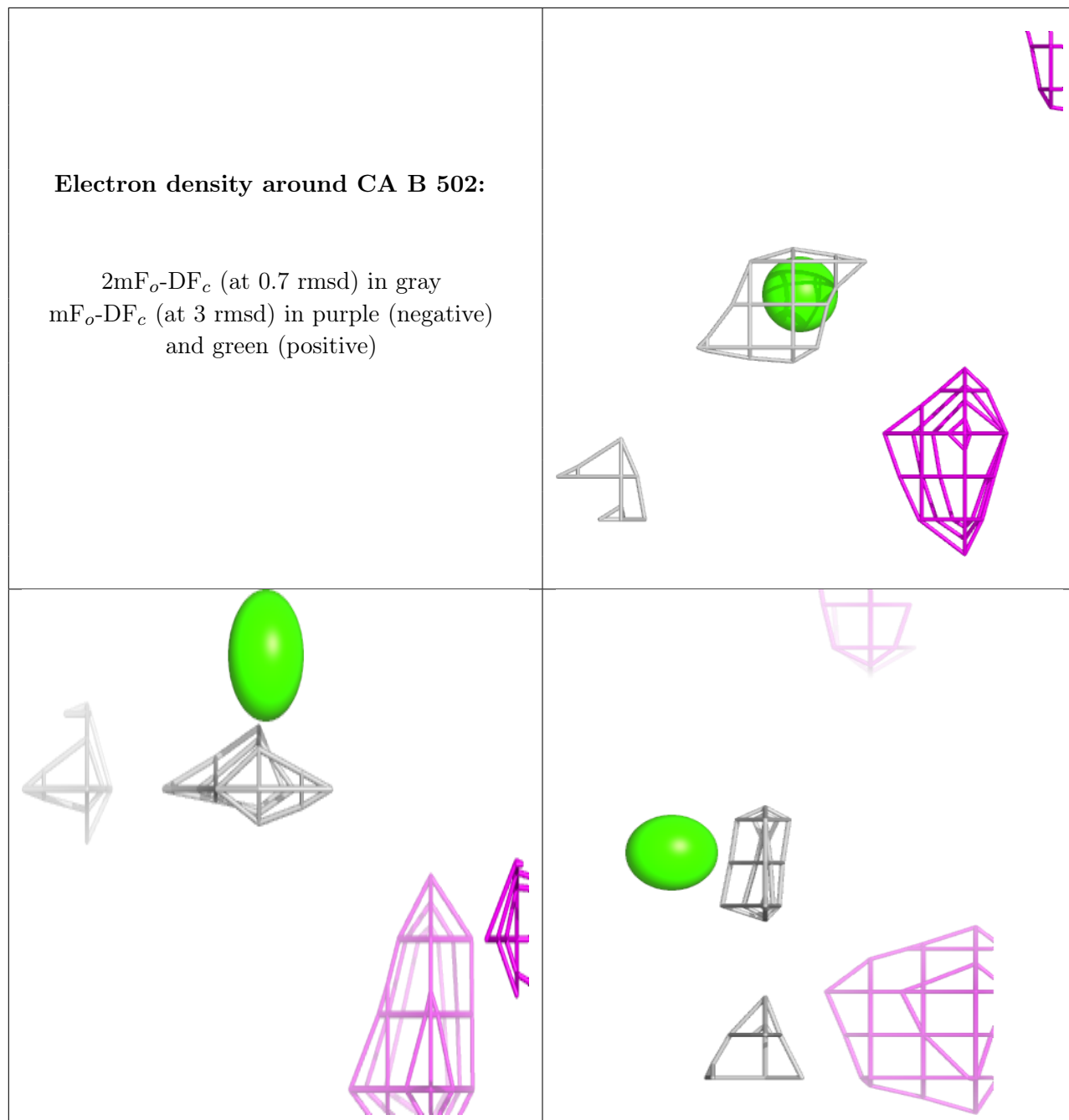
**Electron density around ZN B 501:**

$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



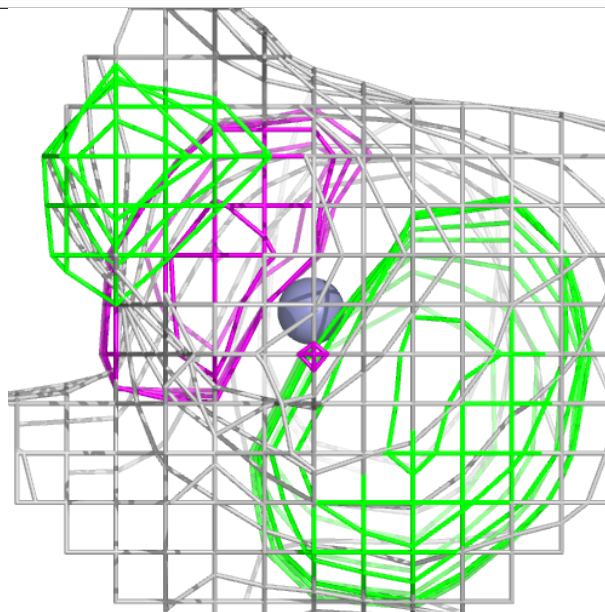
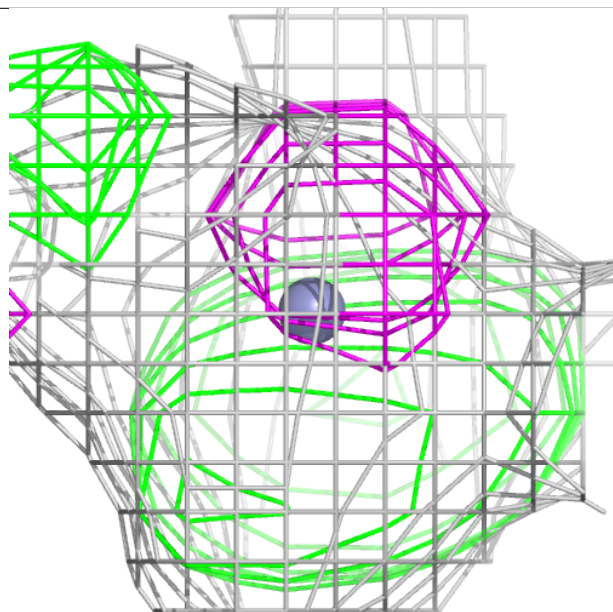
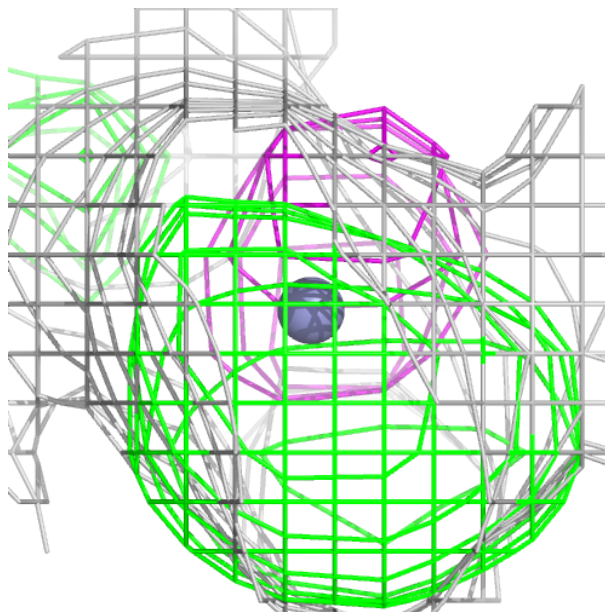
**Electron density around CA B 502:**

$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around ZN A 501:**

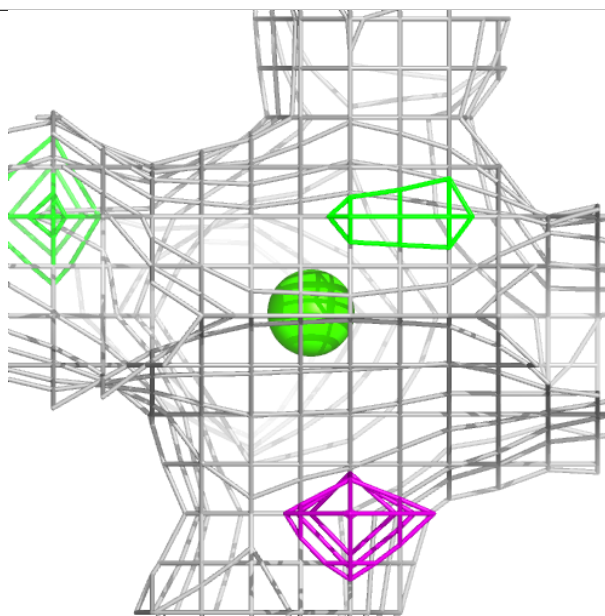
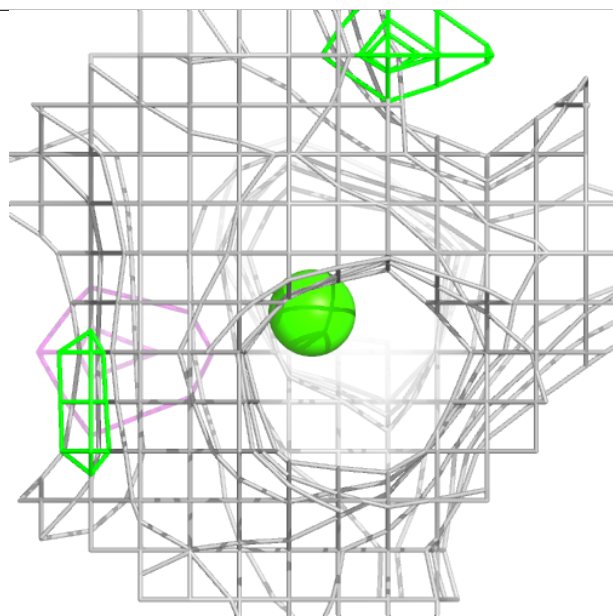
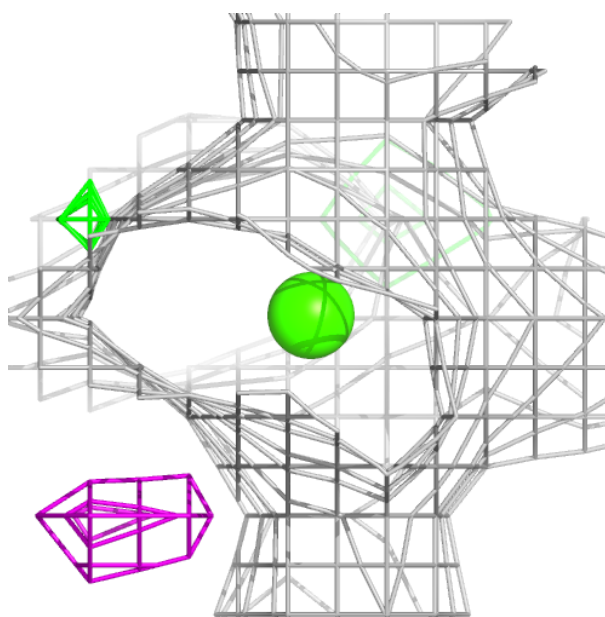
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





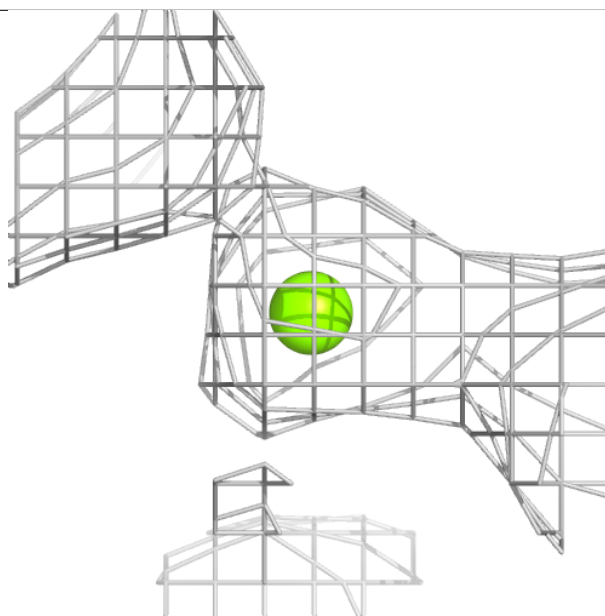
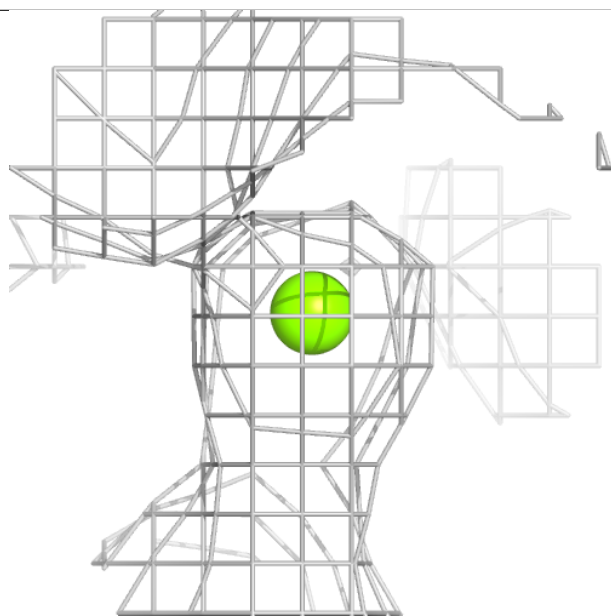
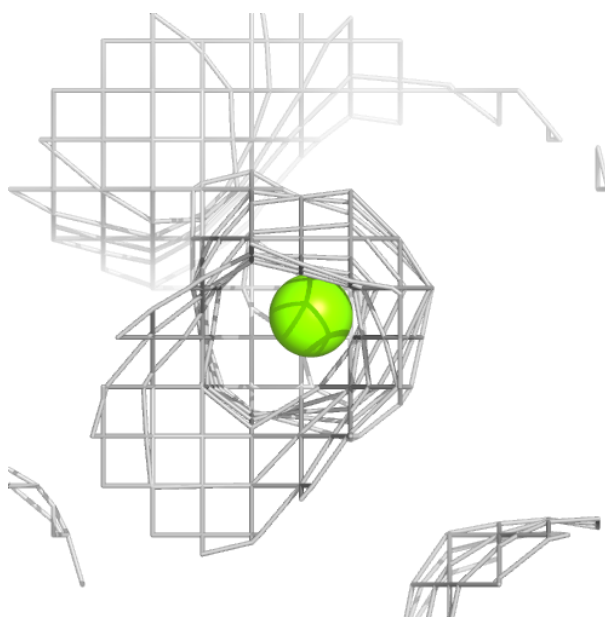
**Electron density around CA A 504:**

$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



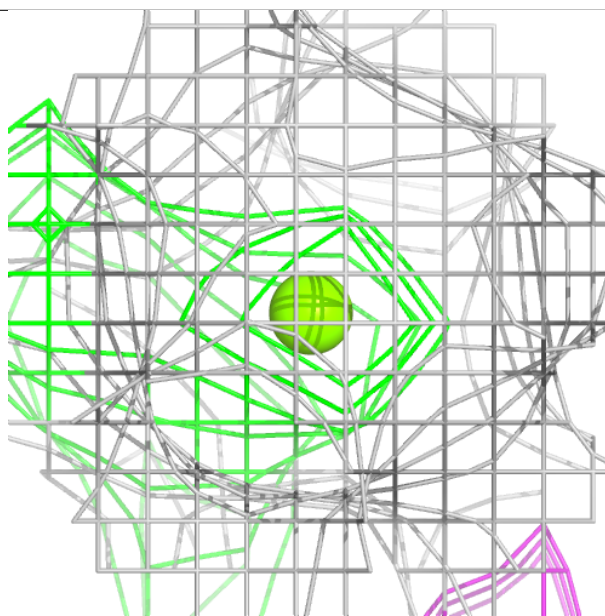
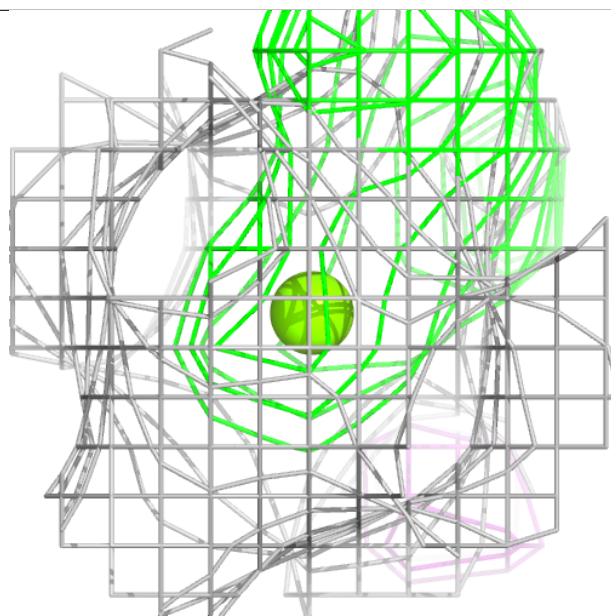
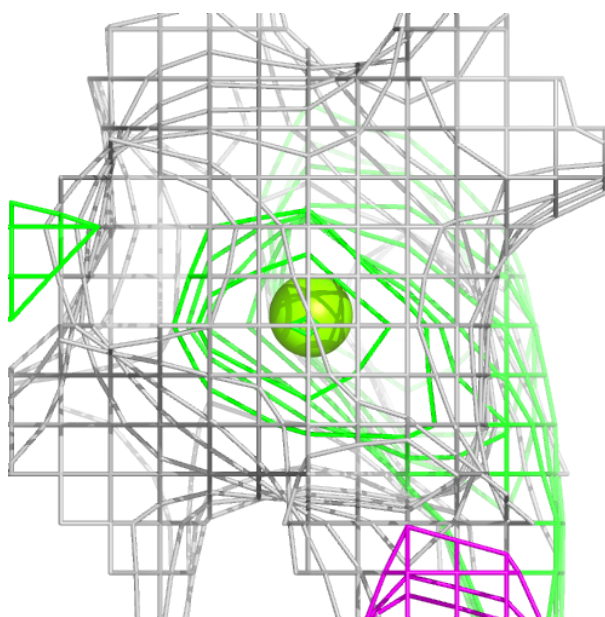
**Electron density around MG A 502:**

$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



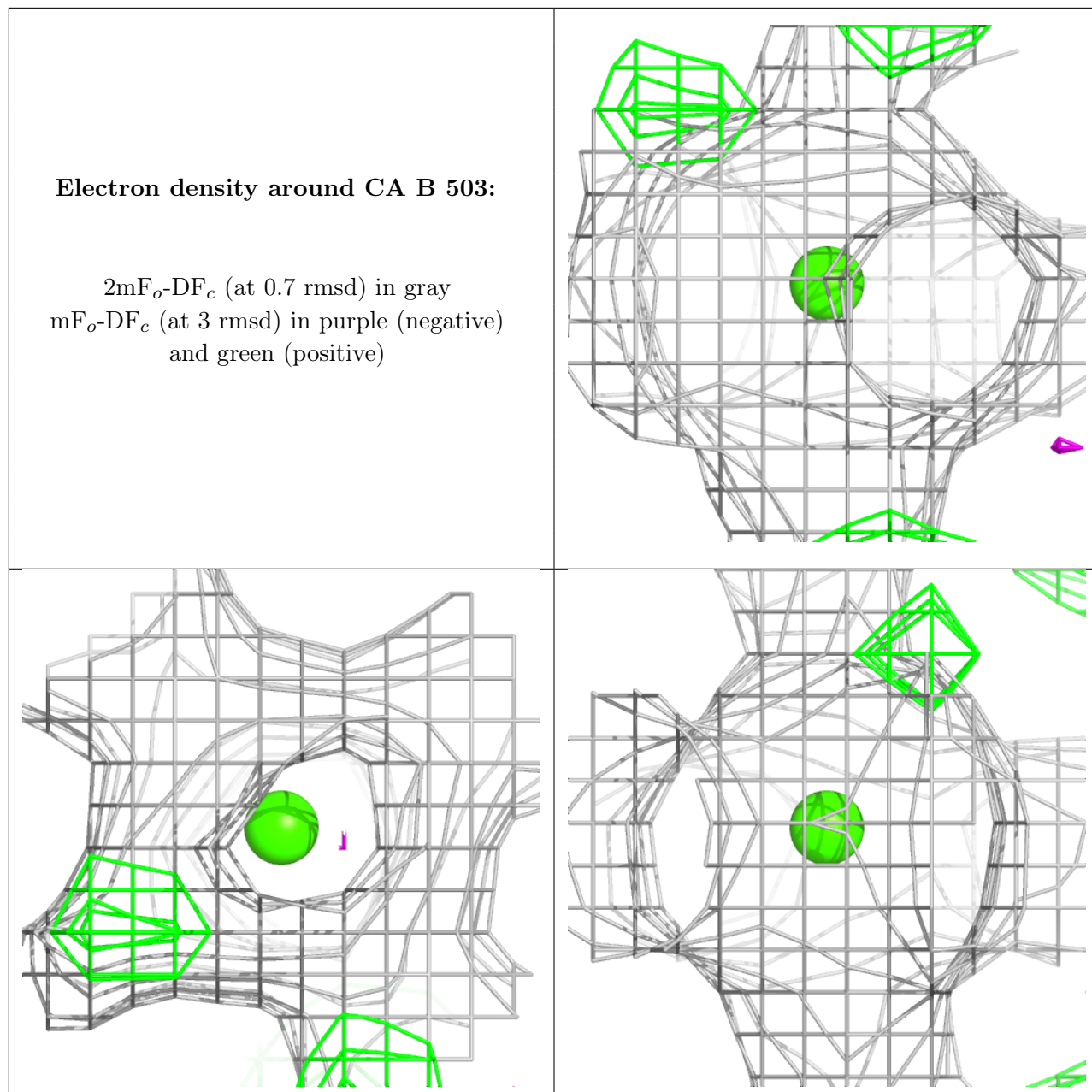
**Electron density around MG A 503:**

$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around CA B 503:**

$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



## 6.5 Other polymers ⓘ

There are no such residues in this entry.