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Supporting information for article:

High-confidence placement of low-occupancy fragments into electron density using the anomalous signal of sulfur and halogen atoms

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Table S1 SMILES codes of fragment analogues and their parental fragment hits.

Fragments	SMILES codes
1E7	NC1=CC(C=CS2)=C2C=C1
2E10	O=C(C)NC1=CC(CCC2)=C2C=C1
7G3	O=C(O)CC1=CSC2=C1C=CC=C2
6A6	NC1=NC(C=CC=C2)=C2S1
9D4	NC1=NNC2=C1C(Cl)=CC=C2
11A7	NC1=NC(C=CC(F)=C2)=C2S1
11A7_AL5	NC1=NC2=CC=C(C=C2S1)I
11A7_AL6	NC1=NC2=CC=C(C=C2S1)Br
7H2	N[C@@H](C)C(C=C1)=CC=C1Cl
7H2_AL1	C[C@H](C1=CC=C(Br)C=C1)N
7H2_AL2	C[C@H](C1=CC=C(I)C=C1)N

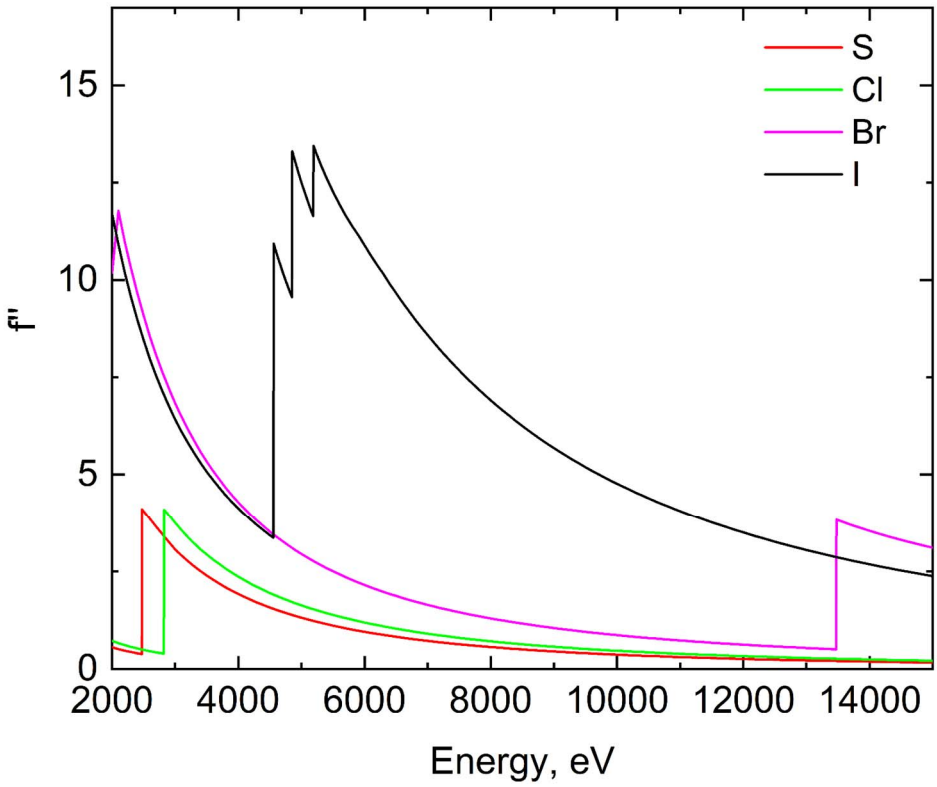

Figure S1 Energy dependence of the anomalous contribution to the structural factor f'' for ions monitored in this study (data from www.bmsc.washington.edu). The value of f'' manifests a sharp increase at the K-edge of S and Cl or L-edges of Br and I, enabling the identification of the ion position.

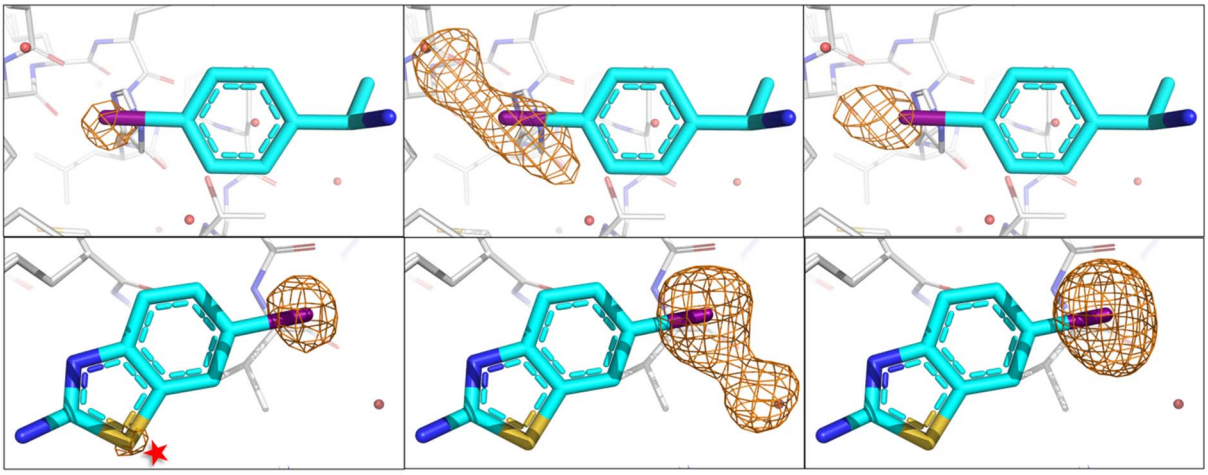

Figure S2 Differences in anomalous difference Fourier maps of iodine-containing fragment analogues 7H2_AL2 **(A-C)** and 11A7_AL5 **(D-F)** collected at incident X-ray energies of 4.5 keV (**A** and **D**), 5.3 keV (**B** and **E**) and 9.0 keV (**C** and **F**). The anomalous difference Fourier maps (contoured at 4 σ level) are shown in orange. Anomalous peaks from the sulphur in 11A7_AL5 are only visible in (**D**) for the 4.5 keV map (indicated by a red star) due to its low f'' value at other two energies.

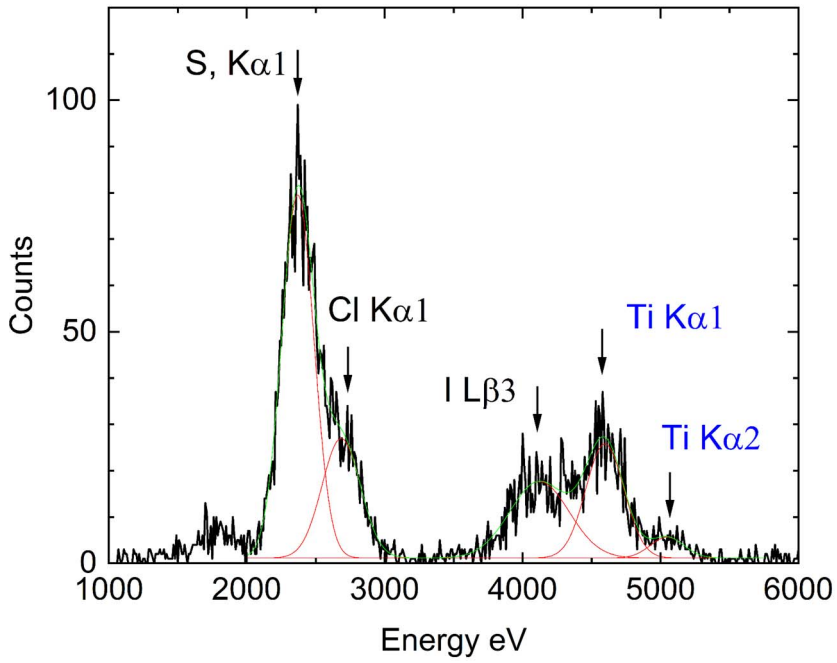

Figure S3 X-ray fluorescence spectrum of the nsp1-11A7_AL5 complex measured at 9 keV beam energy. The Ti K-lines are artefacts caused by a kapton cryo-loop which contained an admixture of titanium.