

Reporting Summary

Nature Portfolio wishes to improve the reproducibility of the work that we publish. This form provides structure for consistency and transparency in reporting. For further information on Nature Portfolio policies, see our [Editorial Policies](#) and the [Editorial Policy Checklist](#).

Statistics

For all statistical analyses, confirm that the following items are present in the figure legend, table legend, main text, or Methods section.

n/a	Confirmed
☐	☒ The exact sample size (<i>n</i>) for each experimental group/condition, given as a discrete number and unit of measurement
☐	☒ A statement on whether measurements were taken from distinct samples or whether the same sample was measured repeatedly
☒	☐ The statistical test(s) used AND whether they are one- or two-sided <i>Only common tests should be described solely by name; describe more complex techniques in the Methods section.</i>
☒	☐ A description of all covariates tested
☒	☐ A description of any assumptions or corrections, such as tests of normality and adjustment for multiple comparisons
☐	☒ A full description of the statistical parameters including central tendency (e.g. means) or other basic estimates (e.g. regression coefficient) AND variation (e.g. standard deviation) or associated estimates of uncertainty (e.g. confidence intervals)
☒	☐ For null hypothesis testing, the test statistic (e.g. <i>F</i> , <i>t</i> , <i>r</i>) with confidence intervals, effect sizes, degrees of freedom and <i>P</i> value noted <i>Give P values as exact values whenever suitable.</i>
☒	☐ For Bayesian analysis, information on the choice of priors and Markov chain Monte Carlo settings
☒	☐ For hierarchical and complex designs, identification of the appropriate level for tests and full reporting of outcomes
☒	☐ Estimates of effect sizes (e.g. Cohen's <i>d</i> , Pearson's <i>r</i>), indicating how they were calculated

Our web collection on [statistics for biologists](#) contains articles on many of the points above.

Software and code

Policy information about [availability of computer code](#)

Data collection	All data used in the manuscript are public datasets from EMPIAR (https://www.ebi.ac.uk/empirar/) and EMDB (https://www.ebi.ac.uk/emdb/).
Data analysis	All necessary scripts, including the GTC scripts and associated template files, for the construction of the GoToCloud platform and the shared EFS in the user's own AWS account are available at https://github.com/KEK-SBRC-CryoEM/gotocloud. List of other tools: RELION 4.0, RELION 3.1.2, UCSF Chimera, version 1.14, AWS ParallelCluster v3.0.3 (Amazon Web Services, Inc.), GCC 9.3.0 compiler, GCC 9.4.0 compiler, Intel® oneAPI Base Toolkit 2022.1.2.146 Intel® oneAPI HPC Toolkit 2022.1.2.117 (Intel Inc.)

For manuscripts utilizing custom algorithms or software that are central to the research but not yet described in published literature, software must be made available to editors and reviewers. We strongly encourage code deposition in a community repository (e.g. GitHub). See the Nature Portfolio [guidelines for submitting code & software](#) for further information.

Data

Policy information about [availability of data](#)

All manuscripts must include a [data availability statement](#). This statement should provide the following information, where applicable:

- Accession codes, unique identifiers, or web links for publicly available datasets
- A description of any restrictions on data availability
- For clinical datasets or third party data, please ensure that the statement adheres to our [policy](#)

All data used in the manuscript are public datasets from EMPIAR (<https://www.ebi.ac.uk/empair/>) and EMDB (<https://www.ebi.ac.uk/emdb/>). EMPIAR-10581 and EMD-0731 for the native nitrite reductase. EMPIAR-10641 and EMD-30913 for the streptavidin.

Research involving human participants, their data, or biological material

Policy information about studies with [human participants or human data](#). See also policy information about [sex, gender \(identity/presentation\), and sexual orientation](#) and [race, ethnicity and racism](#).

Reporting on sex and gender [This information has not been collected.](#)

Reporting on race, ethnicity, or other socially relevant groupings [This information has not been collected.](#)

Population characteristics [The research findings provided in the submitted manuscript do not involve human participants.](#)

Recruitment [The research findings provided in the submitted manuscript do not involve human participants.](#)

Ethics oversight [The research findings provided in the submitted manuscript do not involve human participants.](#)

Note that full information on the approval of the study protocol must also be provided in the manuscript.

Field-specific reporting

Please select the one below that is the best fit for your research. If you are not sure, read the appropriate sections before making your selection.

☒ Life sciences ☐ Behavioural & social sciences ☐ Ecological, evolutionary & environmental sciences

For a reference copy of the document with all sections, see [nature.com/documents/nr-reporting-summary-flat.pdf](https://www.nature.com/documents/nr-reporting-summary-flat.pdf)

Life sciences study design

All studies must disclose on these points even when the disclosure is negative.

Sample size [All data used are public datasets, and sample sizes are determined in the original works. The number of micrographs and particles are reported in Table S1.](#)

Data exclusions [All available data in each dataset is used with no exclusion.](#)

Replication [User can easily reproduce all results in this paper by using the publicly available datasets, software packages, and our scripts.](#)

Randomization [It is not relevant since our samples are not allocated into experimental groups. The randomization used in each RELION algorithm is the same as the original work.](#)

Blinding [All process is performed without human intervention, so blinding is not necessary.](#)

Reporting for specific materials, systems and methods

We require information from authors about some types of materials, experimental systems and methods used in many studies. Here, indicate whether each material, system or method listed is relevant to your study. If you are not sure if a list item applies to your research, read the appropriate section before selecting a response.

Materials & experimental systems

n/a	Involvement in the study
☒	☐ Antibodies
☒	☐ Eukaryotic cell lines
☒	☐ Palaeontology and archaeology
☒	☐ Animals and other organisms
☒	☐ Clinical data
☒	☐ Dual use research of concern
☒	☐ Plants

Methods

n/a	Involvement in the study
☒	☐ ChIP-seq
☒	☐ Flow cytometry
☒	☐ MRI-based neuroimaging

Plants

Seed stocks

Plant materials have not been used.

Novel plant genotypes

Novel plant genotypes have not been produced.

Authentication

Authentication procedures were not needed.