

Resource Summary Report

Generated by [nidm-terms](#) on Jul 28, 2026

HOLLOW

RRID:SCR_005729

Type: Tool

Proper Citation

HOLLOW (RRID:SCR_005729)

Resource Information

URL: <http://hollow.sourceforge.net/>

Proper Citation: HOLLOW (RRID:SCR_005729)

Description: HOLLOW facilitates the production of surface images of proteins. HOLLOW is a portable command-line utility written in Python 2.4-2.7; it does not have any other dependencies (although running under the PyPy JIT interpreter, it runs much faster). The input is a PDB file. The output is a PDB file of dummy water atoms that forms a cast of the voids and channels of a protein. HOLLOW generates a surface from a cast of the protein surface. HOLLOW fills the interior spaces of a protein structure with dummy atoms defined on an overlapping grid. The surface generated by these dummy atoms can be shown to reproduce the surface of the protein at the ideal limit. The use of the surface of the dummy atoms allows us to focus on a specific piece of the interior surface. Simply by deleting dummy atoms, the interior surface can be trimmed to produce a custom portion of the interior space. For advanced coloring of the surface, the B-factor of the dummy atoms can be calculated as the average of the B-factor of the protein atoms surrounding the dummy atoms. This allows various colorings of the surface to be conveyed through the B-factor field of the PDB files. The volume filling representation facilitated by HOLLOW is meant to complement other programs that identify voids, pockets and channels, such as SPHGEN and CASTp, which identify binding sites but cannot produce output that can be rendered in standard molecular graphics software. HOLLOW can be used to help render these binding pockets.

Abbreviations: HOLLOW

Synonyms: HOLLOW - Volume Filling of Protein Structures, HOLLOW: Generating Accurate Representations of Channel and Interior Surfaces in Molecular Structures

Resource Type: software application, data visualization software, data processing software, software resource

Defining Citation: [PMID:19014592](#)

Keywords: surface image, protein, protein image, protein structure, image, channel surface, electrostatic surface, interior pathway surface, ligand-binding surface, molecular structure, python

Funding: Center for Membrane Protein Structure ;
Membrane Protein Expression Center ;
Howard Hughes Medical Institute

Resource Name: HOLLOW

Resource ID: SCR_005729

Alternate IDs: nlx_149186

Record Creation Time: 20220129T080232+0000

Record Last Update: 20260728T043221+0000

Ratings and Alerts

No rating or validation information has been found for HOLLOW.

No alerts have been found for HOLLOW.

Data and Source Information

Source: [SciCrunch Registry](#)

Usage and Citation Metrics

We found 37 mentions in open access literature.

Listed below are recent publications. The full list is available at [nidm-terms](#) .

Ahmed SF, et al. (2025) The structural basis of substrate selectivity of the acinetobactin biosynthetic adenylation domain, BasE. The Journal of biological chemistry, 301(4), 108413.

Morizumi T, et al. (2025) Structural insights into light-gating of potassium-selective channelrhodopsin. Nature communications, 16(1), 1283.

Fu C, et al. (2024) Insight into binding of endogenous neurosteroid ligands to the sigma-1 receptor. Nature communications, 15(1), 5619.

Strauss J, et al. (2024) Functional and structural asymmetry suggest a unifying principle for catalysis in membrane-bound pyrophosphatases. EMBO reports, 25(2), 853.

Li M, et al. (2024) Structural insights into human EMC and its interaction with VDAC. Aging, 16(6), 5501.

Cinca-Fernando P, et al. (2024) Discovery, characterization, and synthetic potential of two novel bacterial aryl-alcohol oxidases. *Applied microbiology and biotechnology*, 108(1), 498.

Ding M, et al. (2024) Probing plant signal processing optogenetically by two channelrhodopsins. *Nature*, 633(8031), 872.

Lyu Y, et al. (2024) Engineering of a mammalian VMAT2 for cryo-EM analysis results in non-canonical protein folding. *Nature communications*, 15(1), 6511.

Serrano A, et al. (2024) Unveiling the kinetic versatility of aryl-alcohol oxidases with different electron acceptors. *Frontiers in bioengineering and biotechnology*, 12, 1440598.

Tajima S, et al. (2023) Structural basis for ion selectivity in potassium-selective channelrhodopsins. *Cell*, 186(20), 4325.

Morizumi T, et al. (2023) Structures of channelrhodopsin paralogs in peptidiscs explain their contrasting K⁺ and Na⁺ selectivities. *Nature communications*, 14(1), 4365.

Silberberg JM, et al. (2022) Inhibited KdpFABC transitions into an E1 off-cycle state. *eLife*, 11.

Melnikov I, et al. (2022) High-pressure crystallography shows noble gas intervention into protein-lipid interaction and suggests a model for anaesthetic action. *Communications biology*, 5(1), 360.

Demmer JK, et al. (2022) Structure of ATP synthase from ESKAPE pathogen *Acinetobacter baumannii*. *Science advances*, 8(7), eabl5966.

Kao WC, et al. (2022) Structural basis for safe and efficient energy conversion in a respiratory supercomplex. *Nature communications*, 13(1), 545.

Velazhahan V, et al. (2022) Activation mechanism of the class D fungal GPCR dimer Ste2. *Nature*, 603(7902), 743.

Heit S, et al. (2021) Structure of the hexameric fungal plasma membrane proton pump in its autoinhibited state. *Science advances*, 7(46), eabj5255.

Silberberg JM, et al. (2021) Deciphering ion transport and ATPase coupling in the intersubunit tunnel of KdpFABC. *Nature communications*, 12(1), 5098.

Tillinghast J, et al. (2021) Structural mechanisms for gating and ion selectivity of the human polyamine transporter ATP13A2. *Molecular cell*, 81(22), 4650.

Kovalev K, et al. (2020) High-resolution structural insights into the heliorhodopsin family. *Proceedings of the National Academy of Sciences of the United States of America*, 117(8), 4131.