

Product Data Sheet

Product Name: Coppersensor 1

Cat. No.: GC62903

Chemical Properties

Cas. No. 874748-20-6

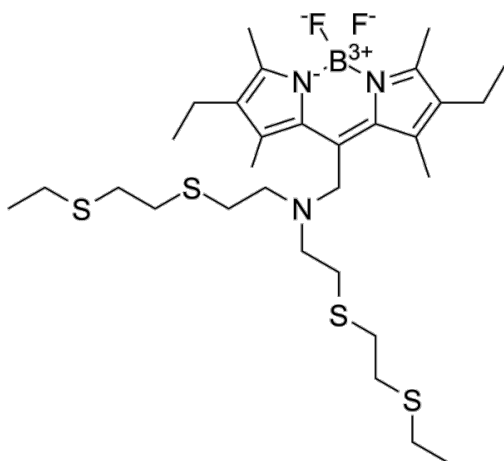
Formula $C_{30}H_{50}BF_2N_3S_4$ M.Wt 629.81

Solubility DMSO : 25 mg/mL (39.69 mM; Need ultrasonic) Storage Store at 2-8°C, protect from light

General tips For obtaining a higher solubility, please warm the tube at 37 °C and shake it in the ultrasonic bath for a while. Stock solution can be stored below -20°C for several months.

Shipping Condition Evaluation sample solution : ship with blue ice All other available size: ship with RT, or blue ice upon request.

Structure



Protocol

Following is our recommended protocol. This protocol only provides a guideline, and should be modified according to your specific needs^[1].

1. Preparation of Reagent Stock Solution for Imaging:

(1) Dissolve 0.63mg of solid Coppersensor 1 in each milliliter of DMSO solvent to prepare a 1mM Coppersensor 1 stock solution (MW 630g/mol).

Caution: Product has not been fully validated for medical applications. For research use only.

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2. Coppersensor 1 Staining of Live Cells:

(1) Cell imaging experiments require a culture period of 1-2 days. Incubate cells according to your normal protocol.

(2) On the day before imaging, passage the cells onto 18mm glass coverslips coated with poly-L-lysine (50µg/mL). Adherent cells for imaging should grow to 50-80% confluence.

(3) Remove the cells from the incubator and transfer a coverslip to a 35mm culture dish containing 3mL of PBS buffer.

(4) Add 15µL of the 1mM Coppersensor 1 stock solution to the culture dish, resulting in a final dye concentration of 5µM. Mix thoroughly.

(The higher the dye concentration, the higher the background fluorescence level)

(5) Incubate in the dark at 25 or 37°C for 5-20 minutes.

3. Imaging of Coppersensor 1 Stained Cells:

(1) Image under a standard confocal microscope with an excitation wavelength of 543nm and an emission wavelength of 576nm. (Coppersensor 1 can be imaged using any type of fluorescence microscope, including epifluorescence, confocal, and multiphoton).

Precautions:

①It is recommended to set up a positive control group, in which cells are incubated with 30µM oleic acid for 8 hours before proceeding with subsequent experiments.

②Fluorescent dyes are prone to quenching. Please try to avoid light exposure to slow down the quenching of fluorescence.

③For your safety and health, please wear a lab coat and disposable gloves when performing the operations.

References:

[1] Miller, E. W., Zeng, L., Domaille, D. W., & Chang, C. J. (2006). Preparation and use of Coppersensor-1, a synthetic fluorophore for live-cell copper imaging. *Nature protocols*, 1(2), 824–827.

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Background

Coppersensor 1 is a fluorescent sensor for selective and sensitive detection of copper(I) ions (Cu^+) in biological samples, including live cells, with an excitation wavelength of 543nm and an emission wavelength of 576nm^[1]. Coppersensor 1 comprising a boron dipyrromethene (BODIPY) chromophore coupled to a thioether-rich receptor, has a picomolar affinity for Cu^+ with high selectivity over competing cellular metal ions. CS1 fluorescence increases up to 10-fold on binding to Cu^+ ^[2]. Copper is the third most abundant transition metal after iron and zinc, which plays a crucial role in the biological system as it is a cofactor of various human enzymes for pigment production, antioxidant, defense, and other metabolism^[3]. Excess copper ions can generate reactive oxygen species (ROS) that damage bio-molecules like proteins, nucleic acids, and lipids, leading to liver, kidney, and digestive disorders, whereas insufficient copper ion intake can lead to metabolic disorders of the brain and nervous system^{[4][5]}. Coppersensor 1 can be applied in the research of cancer, antibacterial mechanisms, and neurodegenerative diseases^[6-8].

References:

- [1] Miller, E. W., Zeng, L., Domaille, D. W., & Chang, C. J. (2006). Preparation and use of Coppersensor-1, a synthetic fluorophore for live-cell copper imaging. *Nature protocols*, 1(2), 824–827.
- [2] Zeng, L., Miller, E. W., Pralle, A., Isacoff, E. Y., & Chang, C. J. (2006). A selective turn-on fluorescent sensor for imaging copper in living cells. *Journal of the American Chemical Society*, 128(1), 10–11.
- [3] Li, C., Li, Y., & Ding, C. (2019). The Role of Copper Homeostasis at the Host-Pathogen Axis: From Bacteria to Fungi. *International journal of molecular sciences*, 20(1), 175.
- [4] Scolari Grotto, F., & Glaser, V. (2024). Are high copper levels related to Alzheimer's and Parkinson's diseases? A systematic review and meta-analysis of articles published between 2011 and 2022. *Biometals : an international journal on the role of metal ions in biology, biochemistry, and medicine*, 37(1), 3–22.
- [5] Madsen, E., & Gitlin, J. D. (2007). Copper and iron disorders of the brain. *Annual review of neuroscience*, 30, 317–337.
- [6] Hu, Y., Qian, Y., Wei, J., Jin, T., Kong, X., Cao, H., & Ding, K. (2021). The Disulfiram/Copper Complex Induces Autophagic Cell Death in Colorectal Cancer by Targeting ULK1. *Frontiers in pharmacology*, 12, 752825.
- [7] Santo, C. E., Quaranta, D., & Grass, G. (2012). Antimicrobial metallic copper surfaces kill

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Staphylococcus haemolyticus via membrane damage. *MicrobiologyOpen*, 1(1), 46–52.

[8] Eskici, G., & Axelsen, P. H. (2012). Copper and oxidative stress in the pathogenesis of Alzheimer's disease. *Biochemistry*, 51(32), 6289–6311.

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