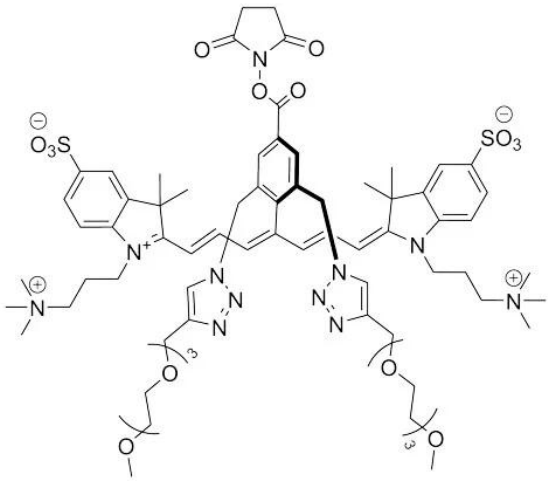
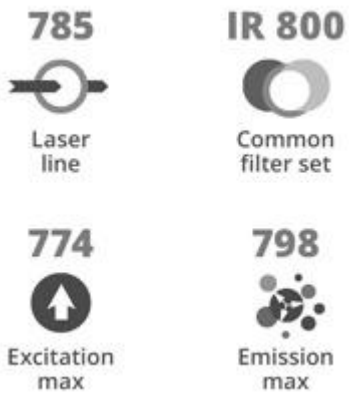
www.vectorlabs.com
Email: customerservice@vectorlabs.com
Telephone: (650) 697-3600

MB 800Z NHS ESTER

SKU: FP-1786



DESCRIPTION



MB 800Z (also known as s775z) is a conceptually new class of sterically shielded NIR cyanine heptamethine dye that was developed at professor Bradley D. Smith laboratory. This dye contains two shielding PEG arms directly over both faces of the heptamethine fluorochrome blocking any undesired bimolecular association processes and thus dramatically enhances the fluorescence brightness. A recently published antibody labeling study clearly demonstrated 1-2 order of magnitude increase in brightness compared to commercially available NIR dyes as a result of almost complete prevention of stacking of multiple fluorophores

For research use only. Not intended for therapeutic or diagnostic use in animals or humans.

appended to the antibody surface (see description section).

MB 800Z is a zwiteroinic, charge-balanced dye with an equal number of anionic sulfonate and cationic ammonium residues, a structural feature that is known to reduce interactions with off - target biological surfaces. MB 800Z will enable researchers to greatly improve various types of indirect NIR immunofluorescence imaging and diagnostics applications that require high sensitivity and also develop new photonintense techniques that require high photostability.

Cyanine heptamethine dyes are well-known NIR fluorophores, with emission wavelengths >740 nm, and often are reagents of choice for labeling antibodies. Two of the most popular commercial NIR cyanine heptamethine dyes for antibody conjugation are IRDye 800CW and DyLight 800. While these NIR dyes are undoubtedly useful for many types of immunofluorescence technologies, the resulting NIR dye-labeled antibodies sometimes exhibit performance limitations due to three inherent fluorophore concerns. (1) A meso-OAryl group connected directly to the heptamethine fluorochrome group is susceptible to nucleophilic displacement by biological amines and thiols[1, 2] resulting in a diminished chemical stability of the dye-antibody conjugates during synthesis, storage, or the time-course of an imaging experiment. In addition, the electron-donating meso-OAryl group promotes high fluorochrome reactivity with electrophilic singlet oxygen, resulting in relatively poor dye photostability.[3,4] (2) Both dyes are flat molecules with a hydrophobic core and a polyanionic charge periphery. Thus, the chemical conversion of a small polar, cationic lysine residue on the antibody surface to a large hydrophobic, polyanionic dye derivative has the potential to produce substantial changes in antibody folding and physiochemical properties, leading to lower antibody stability and decreased target specificity.[4-8] (3) When activated versions of these hydrophobic dyes are conjugated to an antibody surface, they tend to attach at the proximal lysine sites as stacked face-to-face dimers, which produces a diagnostic H-dimer peak in the absorbance spectra that is nonfluorescent.[8,9] Moreover, the close stacking of proximal conjugated IRDye 800CW or DyLight800 on an antibody surface amplifies the potential for a deleterious effect on antibody targeting because of a localized patch of polyanionic charge and hydrophobicity.

In order to address these drawbacks of commercially NIR cyanine a conceptually new class of sterically shielded NIR dyes was developed in Dr. Bradley D. Smith laboratory.[10, 11] These dyes contain two shielding PEG arms directly over both faces of the heptamethine fluorochrome blocking any undesired bimolecular association processes and thus enhance the fluorescence brightness. A recently published antibody labeling study clearly demonstrated 1-2 order of magnitude increase in brightness compared to commercially available NIR dyes as a result of almost complete prevention of stacking of multiple fluorophores appended to the antibody

For research use only. Not intended for therapeutic or diagnostic use in animals or humans.

surface.[10, 11]

These sterically shielded NIR dyes with greatly improved chemical and photochemical stability and substantially enhanced brightness will enable researchers to greatly improve various types of indirect NIR immunofluorescence imaging and diagnostics applications that require high sensitivity and also develop new photonintense techniques that require high photostability.

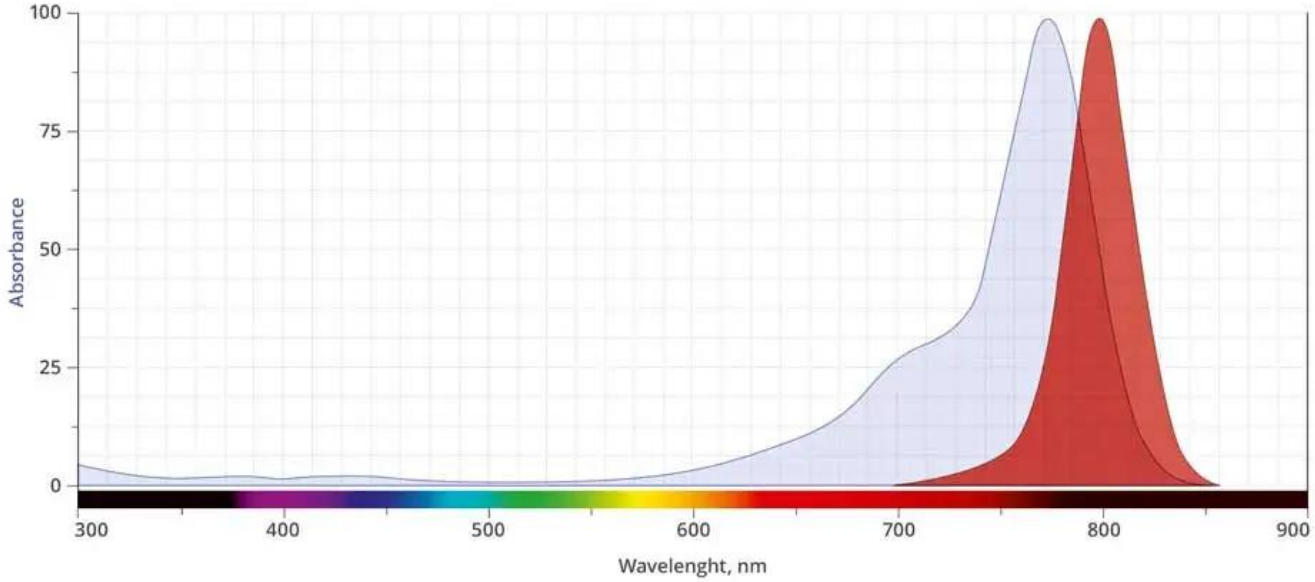
MB 800Z is a zwiteroinic, charge-balanced dye with an equal number of anionic sulfonate and cationic ammonium residues, a structural feature that is known to reduce interactions with off -target biological surfaces.[12,13]

SPECIFICATIONS

Molecular Weight	1471.67 (protonated)
Extinction Coefficient	205,000 cm-1M-1
Reactivity	Primary amine
Unit Size	1 mg, 5 mg, 25 mg, 100 mg
Solubility	Water, DMSO, DMF
Storage Instructions	-50°C to -85°C
Spectrally Similar Dyes	IRDye® 800, DyLight® 800
Excitation/Emission Maximum	774/798 nm
Shipping Conditions	Dry ice
Shipping Instructions	Dry ice

ABS/EM SPECTRA

For research use only. Not intended for therapeutic or diagnostic use in animals or humans.



SELECTED REFERENCES

1. Van Leeuwen, F. W. B., *et al.* (2016). Synthesis and systematic evaluation of symmetric sulfonated centrally Csingle bondC bonded cyanine near-infrared dyes for protein labelling. *Elsevier, Dyes and Pigments,* **132**, 7-19. [ScienceDirect]
2. Wheat, T. E., *et al.* (2002). IRDye78 conjugates for near-infrared fluorescence imaging *Mol Imaging,* **1 (4)**, 354-64. [PubMed]
3. Clarke, D. T., *et al.* (2012). Multicolour Single Molecule Imaging in Cells with Near Infra-Red Dyes. *PNAS,* **No. e36265**. [PLoS One]
4. Robinson, C. M., *et al.* (2019). A Nonaggregating Heptamethine Cyanine for Building Brighter Labeled Biomolecules. *ACS Chem. Biol,* **14**, 934−940. [ACS Publications]
5. Gibbs, S., *et al.* (2013). Targeted zwitterionic near-infrared fluorophores for improved optical imaging. *Nat Biotechnol,* **31**, 148-153. [Nature Biotechnology]
6. Hartman, Y., *et al.* (2015). Fluorescence-guided resection of experimental malignant glioma using cetuximab-IRDye 800CW. *Br J Neurosurg.,* **29**, 850–858. [PubMed]
7. Vereb, G., *et al.* (2018). The Effect of Fluorophore Conjugation on Antibody Affinity and the Photophysical Properties of Dyes. *Biophys. J.,* **114**, 688-700. [PubMed]
8. Harms, G. S., *et al.* (2000). Anomalous Fluorescence Enhancement of Cy3 and Cy3.5 versus Anomalous Fluorescence Loss of Cy5 and Cy7 upon Covalent Linking to IgG and Noncovalent Binding to Avidin. *Bioconjugate Chem.,* **11**, 696−704. [ACS Publications]
9. Hamann, F. M., *et al.* (2011). Suitable Labels for Molecular Imaging – Influence of Dye Structure and Hydrophilicity on the Spectroscopic Properties of IgG Conjugates.

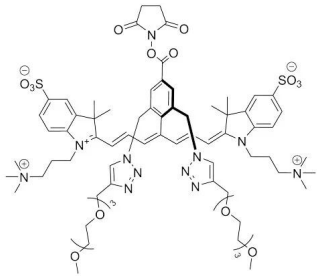
For research use only. Not intended for therapeutic or diagnostic use in animals or humans.

Bioconjugate Chem., **22 (7)**, 1298–1308. [ACS Publications]
10. Smith, B. D, *et al.* (2020). Sterically Shielded Heptamethine Cyanine Dyes for Bioconjugation and High Performance Near-Infrared Fluorescence Imaging. *Angew. Chem. Int. Ed.,* **59**, 12154–12161. [PubMed]
11. Smith, B. D, *et al.* (2021). High-Performance Near-Infrared Fluorescent Secondary Antibodies for Immunofluorescence. *Analytical Chemistry,* **93 (7)**, 3643-3651. [PubMed]
12. Schnermann, M. J., *et al.* (2016). Role of Fluorophore Charge on the In Vivo Optical Imaging Properties of Near-Infrared Cyanine Dye/Monoclonal Antibody Conjugates . *Bioconjugate Chem.,* **27 (2)**, 404-13. [PubMed]
13. Ramsey, J. D., *et al.* (2020). Interactions between Biomolecules and Zwitterionic Moieties: A Review. *Biomacromolecules,* **21 (7)**, 2557-2573. [PubMed]

DOCUMENTS

- Safety Data Sheet
- Datasheet

GALLERY IMAGES



For research use only. Not intended for therapeutic or diagnostic use in animals or humans.