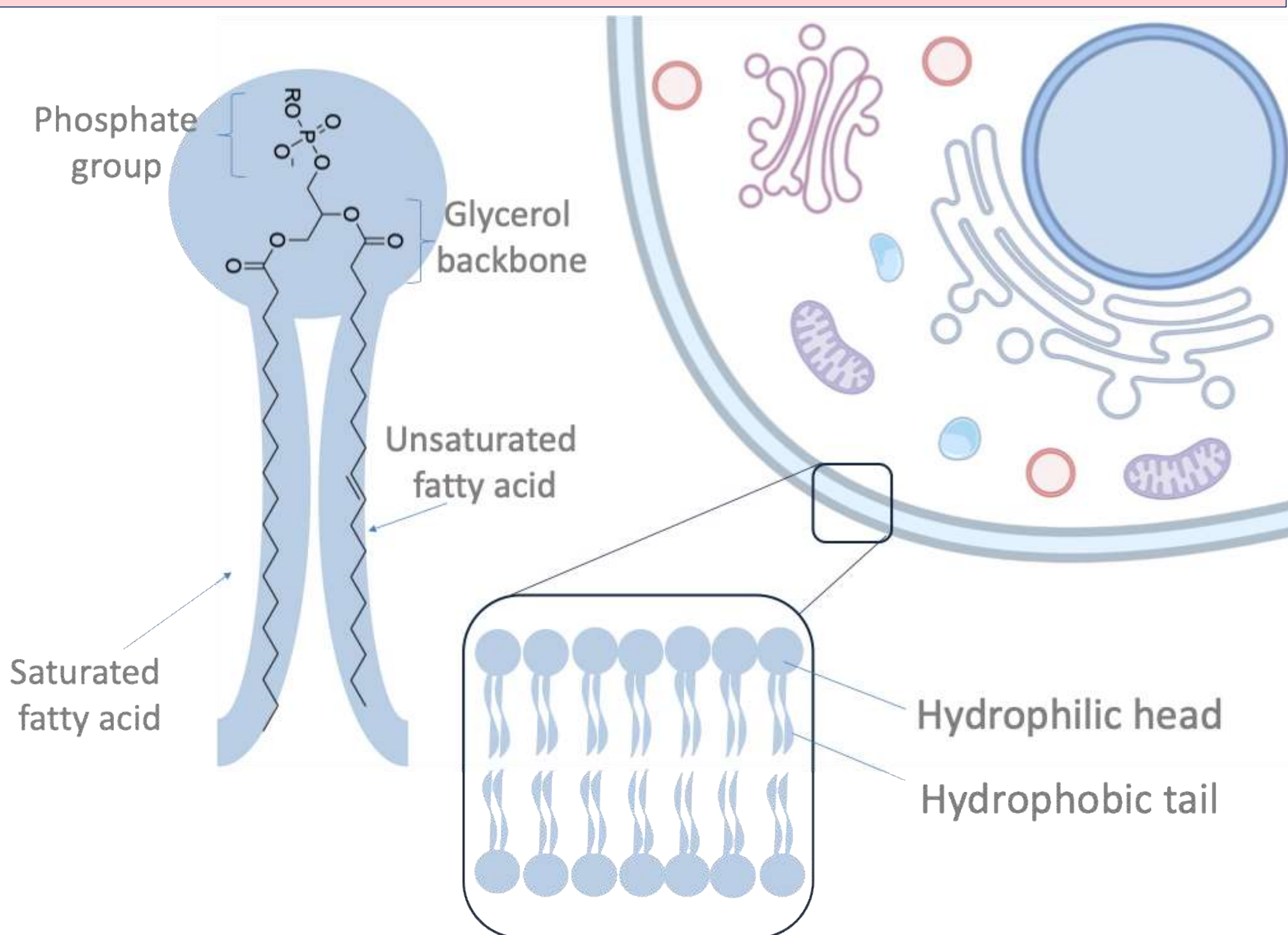


Spatially Controlled ROS Generation at Lipid Bilayers Using Membrane-Targeted BODIPY Photosensitizers

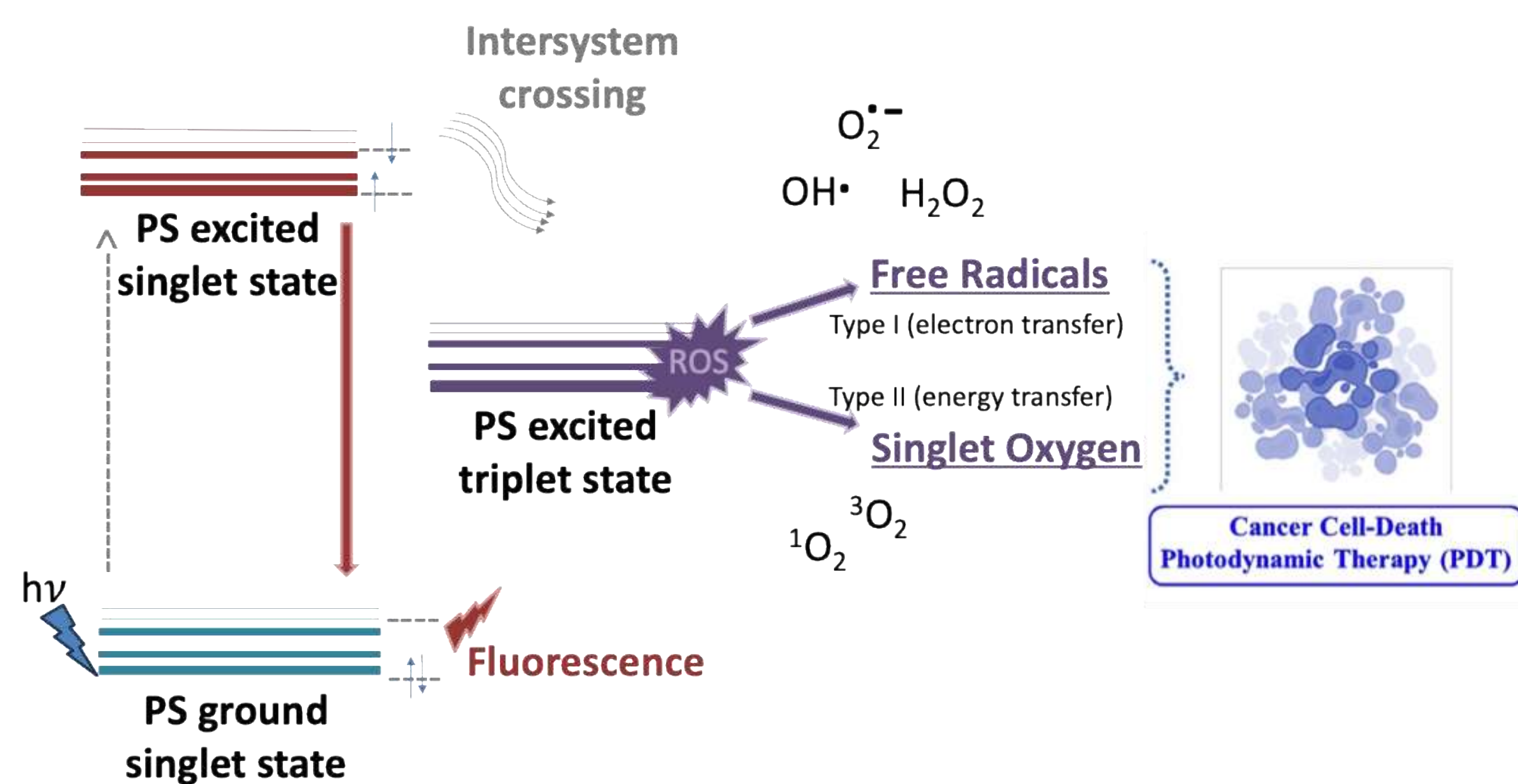
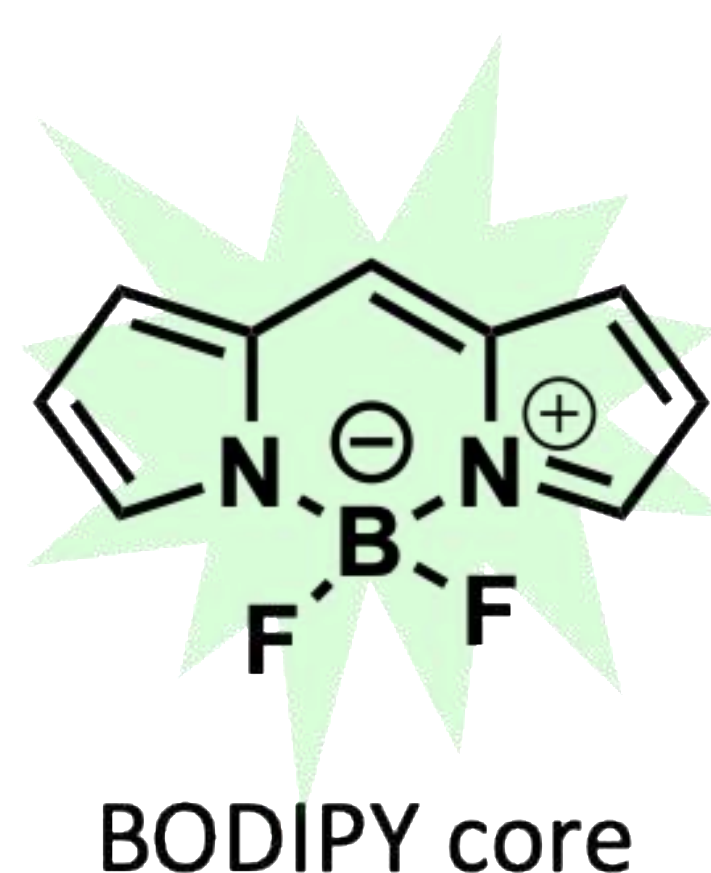
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Introduction



Biological membranes are composed of lipid bilayers that play essential roles in cellular organization and signaling.

- ➔ High fluorescence quantum yield
- ➔ Highly photostable
- ➔ Biologically acceptable
- ➔ Tunable photophysical and cell targeting properties

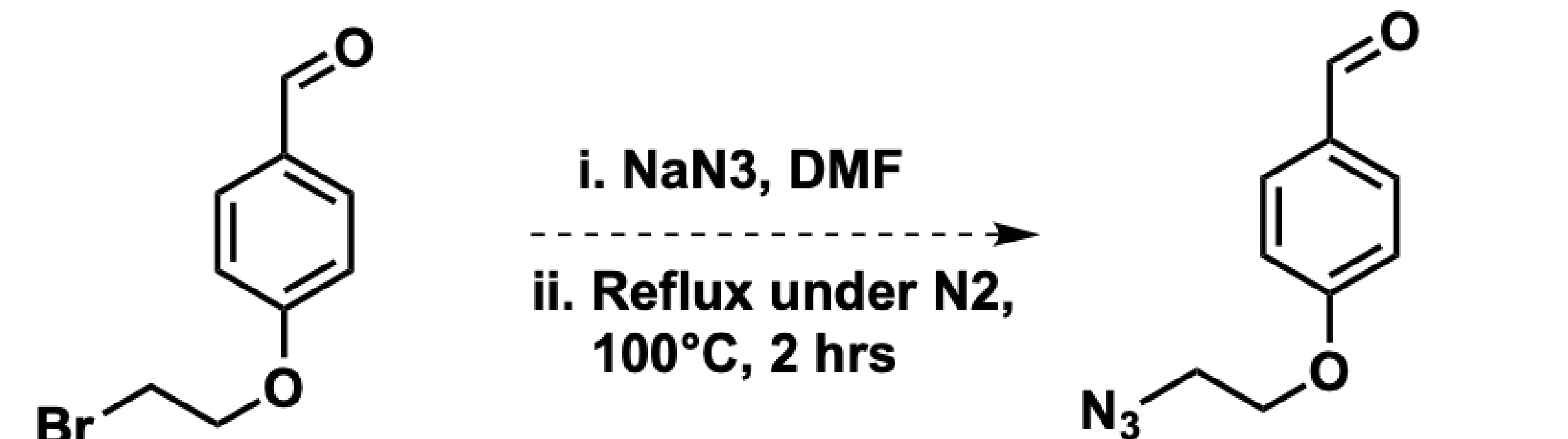
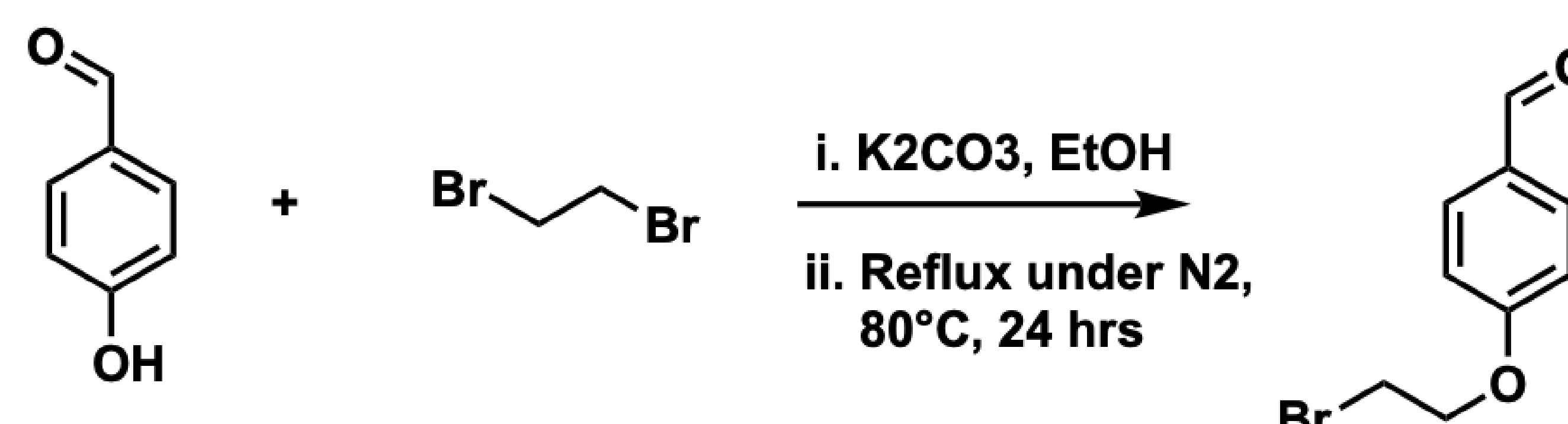


Upon light activation, the molecule generates reactive oxygen species (ROS), enabling controlled oxidative chemistry at membrane interfaces.

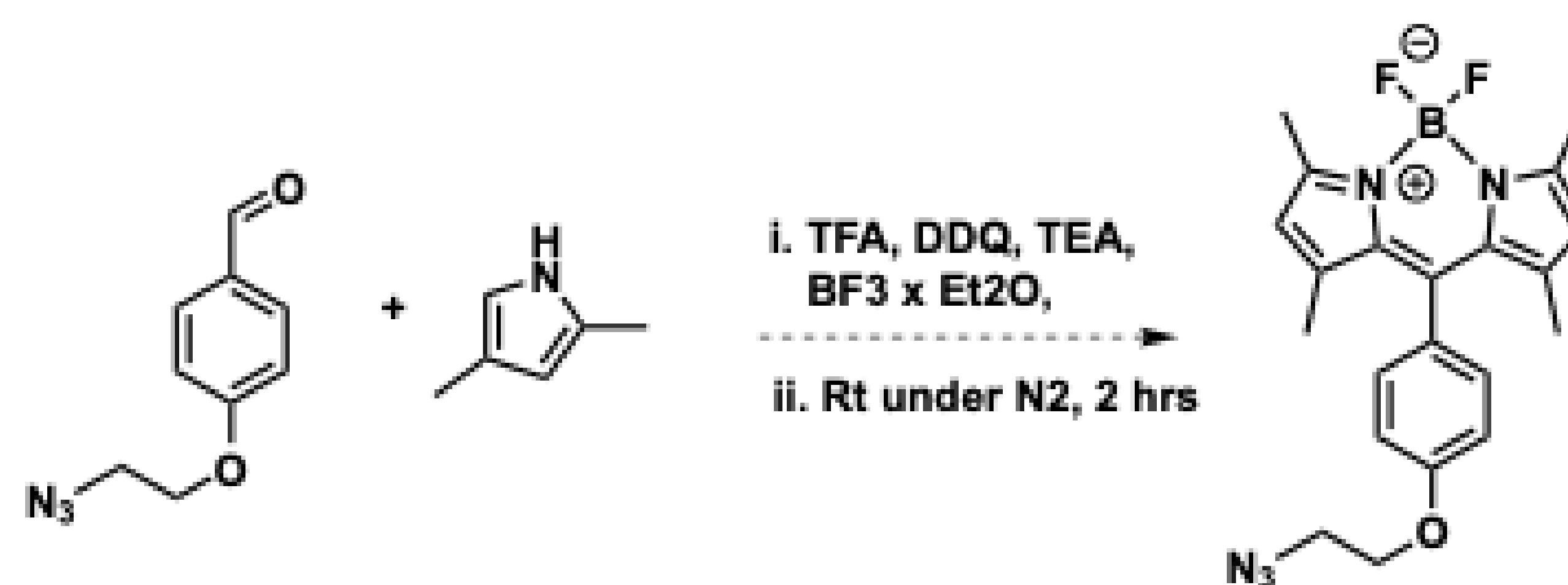
Aims

- Synthesize an iodinated-BODIPY that can be attached to lipid membranes via click chemistry.
- Study UV-Vis. absorption and emission spectroscopic properties.
- Determine type of ROS generation using various commercially available ROS sensors.
- Investigate membrane localization and lipid-ROS interactions.
- Investigate membrane localization and intracellular ROS generation via confocal microscopic imaging

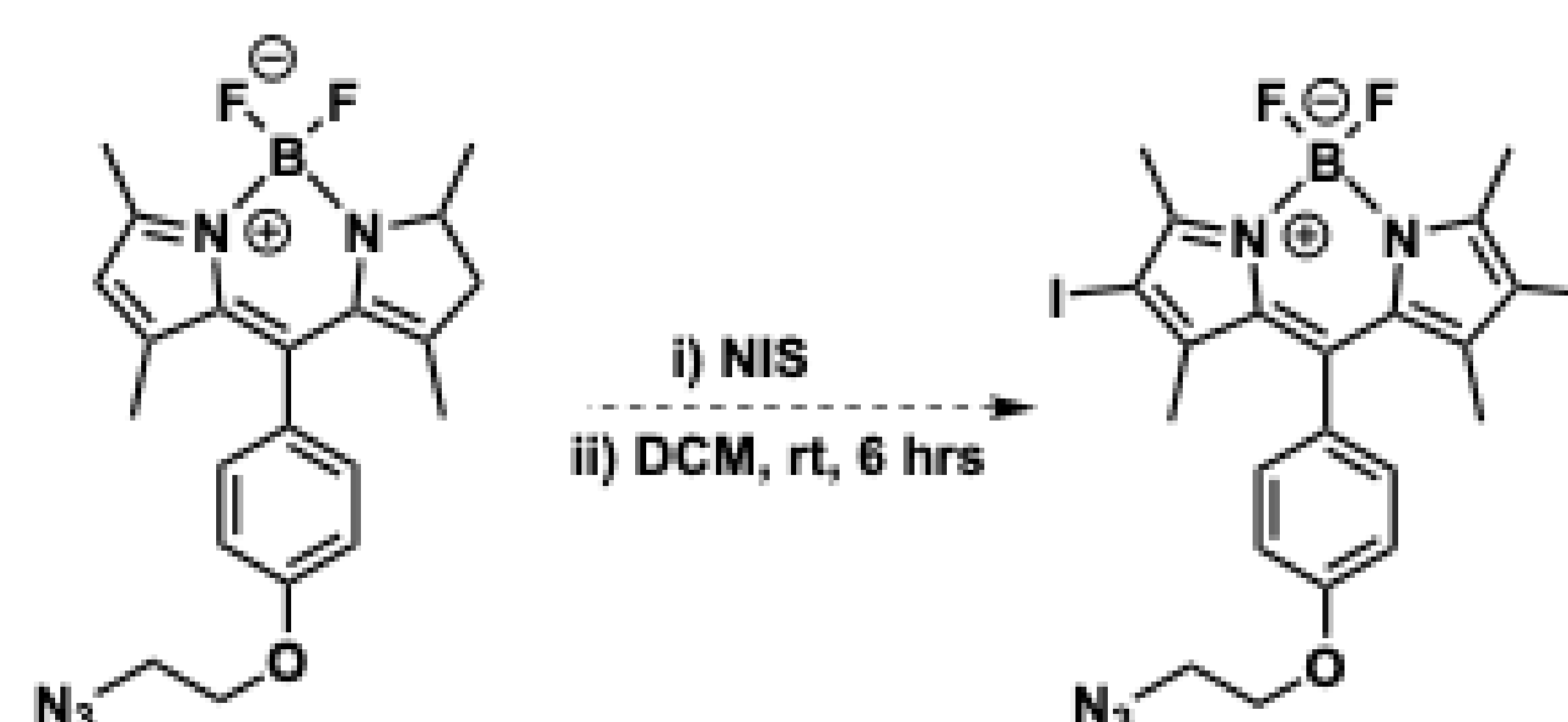
Synthesis of Photosensitizer



Stage 1. Reaction Scheme of starting materials to prepare the GFP core.



Stage 2. Formation of a BODIPY derivative photosensitizer.

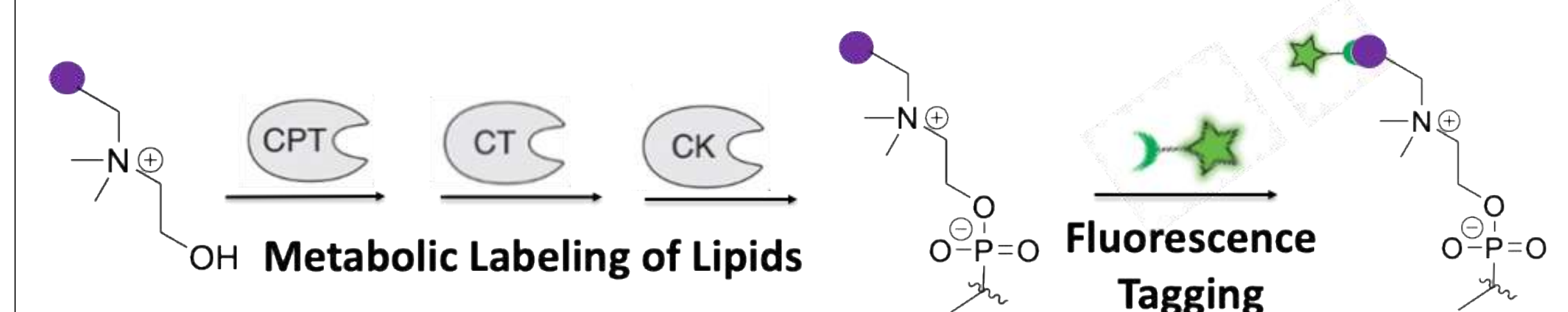


Stage 3. Iodination of BODIPY derivative.

Future Directions

- Structural characterization of synthesized compounds using NMR and LC-MS.
- Photophysical characterization of the synthesized compounds using UV-Vis. absorption and emission spectroscopy.
- Determine type of ROS generated by synthesized Photosensitizer by Specific assay kits.
- ROS generation and detection upon light irradiation of the photosensitizer anchored to membranes

Conclusions



- Membrane-targeted BODIPY photosensitizers will be synthesized and characterized to evaluate their photophysical properties and light-induced ROS generation.
- Probes will enable ROS generation specifically at lipid bilayers, providing a tool to study lipid-ROS interactions with spatial precision at membrane interfaces.

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- (2) The Journal of Physical Chemistry A 2015, 119 (26), 6791–6806
- (3) Oxidative Medicine and Cellular Longevity 2017, 2017, 1–13.