



Synthesis and Photophysical Characterization of Imidazolidinone Macrocyclic Chromophores

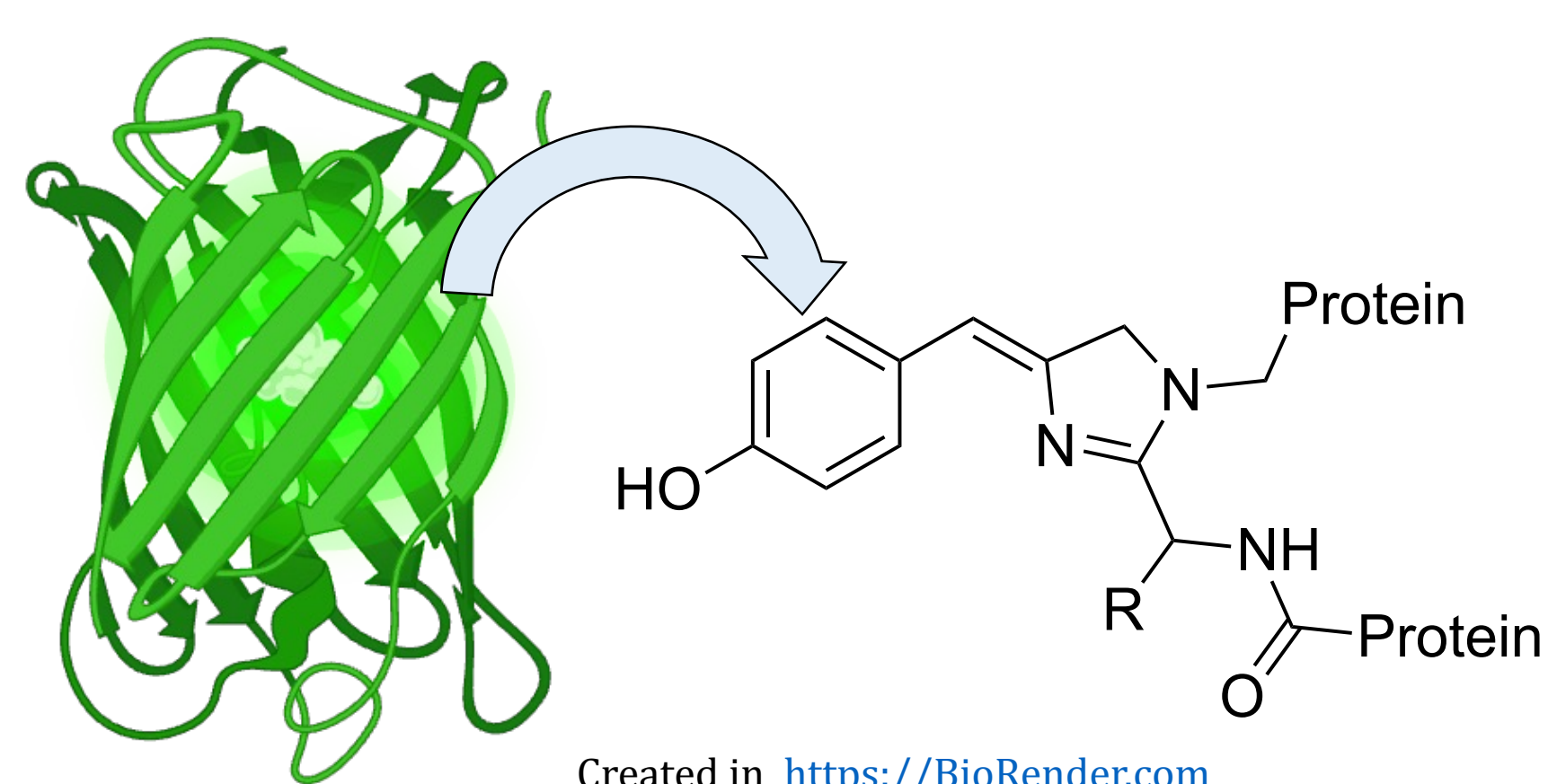
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Introduction

Fluorophores are essential tools for cellular imaging, enabling the visualization of the intricacies of biological processes.

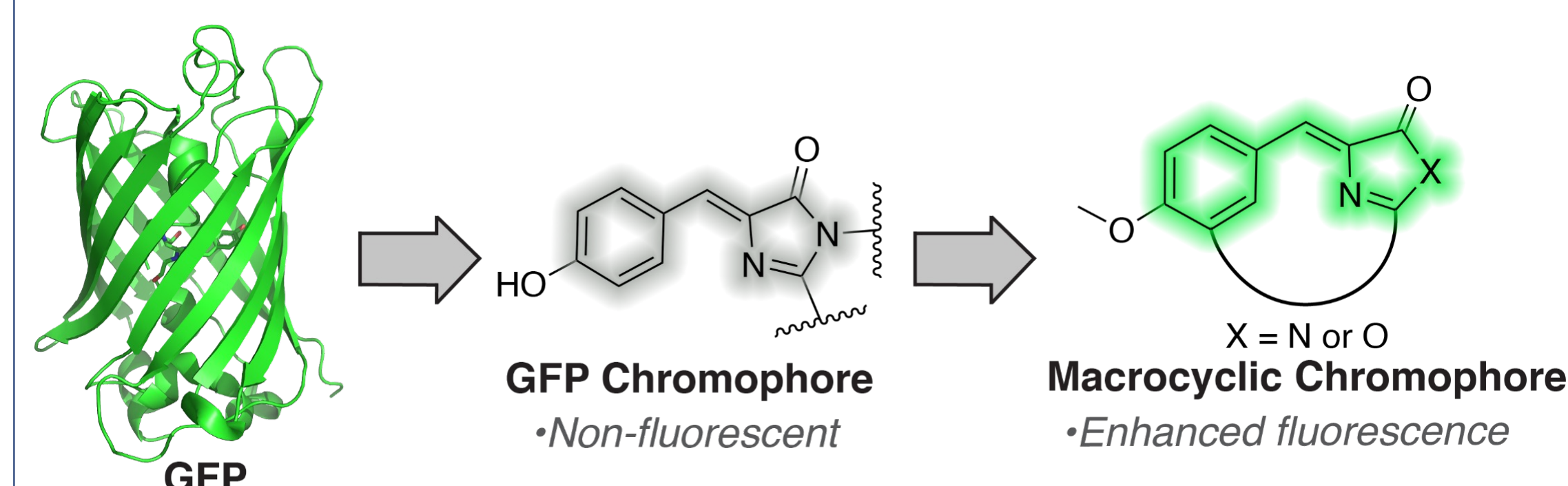
The discovery of green fluorescent protein (GFP) revolutionized the field by allowing fluorophores to be genetically encoded into organisms.



Small-molecule GFP analog fluorophores also exist, but the fluorescence is dependent on environments to restrict the motion of the chromophore.

Research Objectives

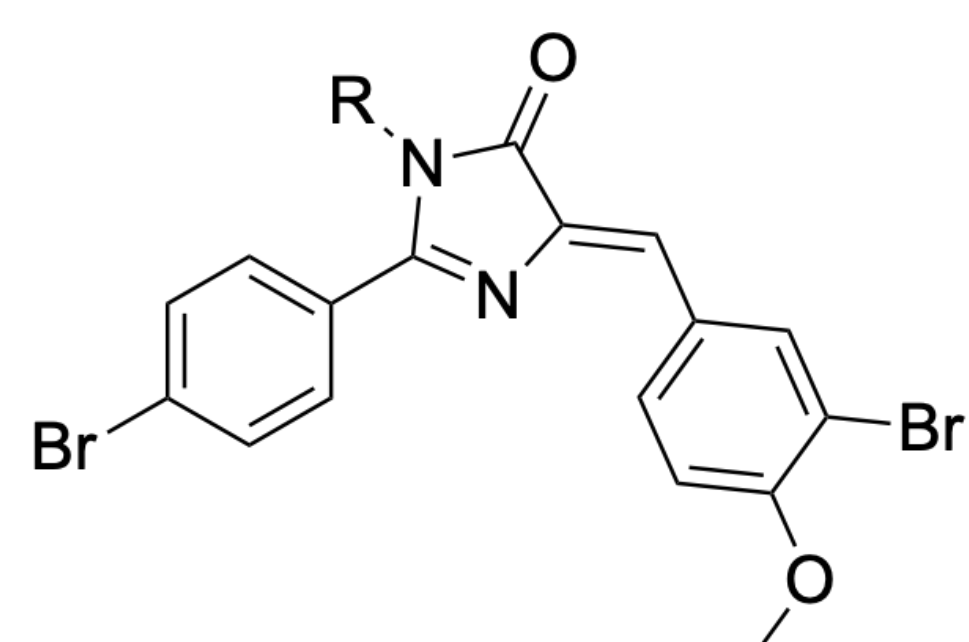
This research explores a macrocyclic fluorophore inspired by the GFP chromophore, designed to achieve a tunable red-shifted emission, bridging the gap between small-molecule GFP analogs and genetically encoded fluorophores.



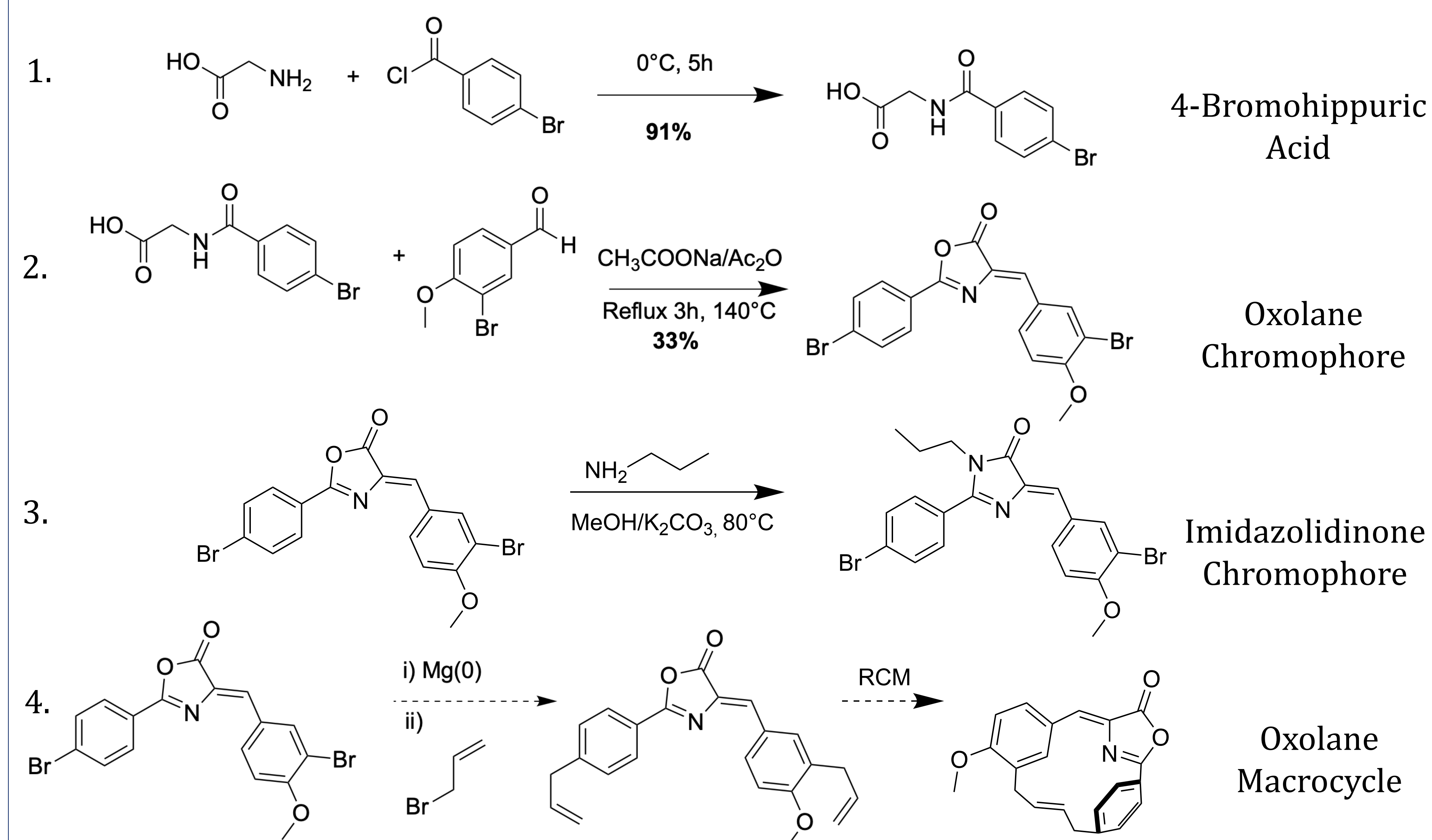
Introduction of Structural Variation

The synthetic route includes an oxygen to nitrogen swap in the chromophore core, mimicking GFP's structure.

This step enables the photophysical properties to be tunable through the introduction of structural variation.

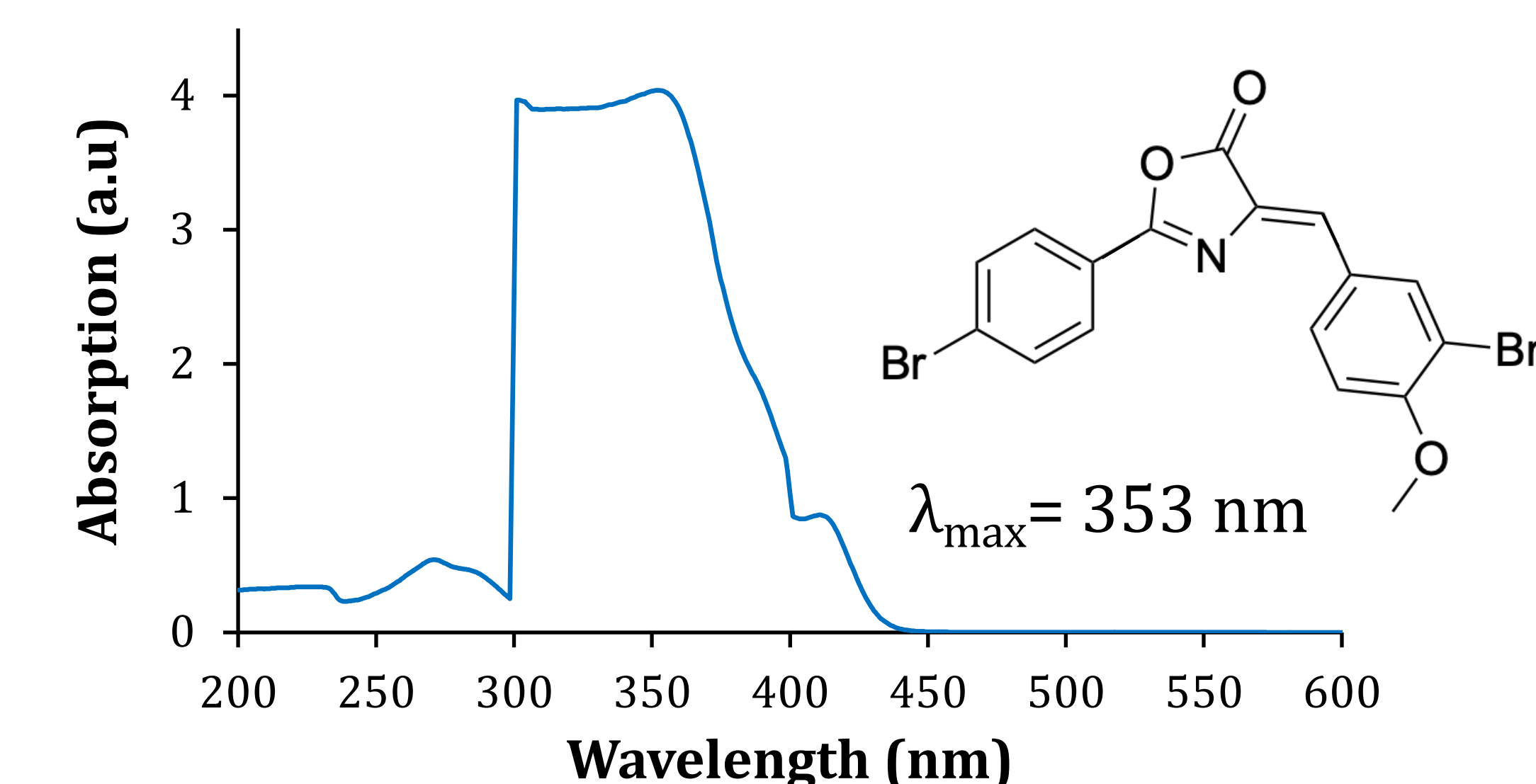


Synthetic Route



Results

UV-Vis Data of Oxolane Chromophore in 100% Chloroform

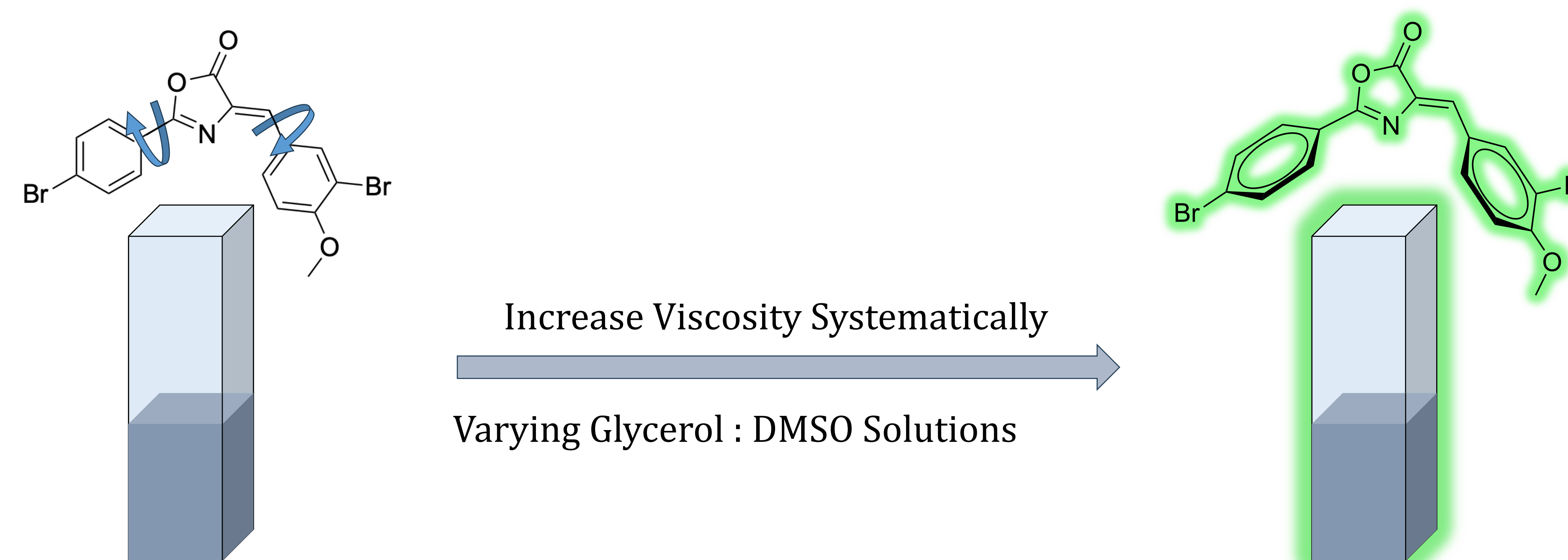


Summary and Outlook

- This GFP macrocyclic chromophore shows promise for a red shifted synthetic fluorophore.
- The introduction of structural variants to the chromophore structure alters the photophysical properties of the chromophore.
- UV-Vis and Fluorescence spectroscopy will be used to evaluate the changes in photophysical properties.
- This work lays the foundation for further exploration of macrocyclic designs and their potential to advance fluorescence-based applications in scientific and medical fields.

Evaluating Photophysical Properties

UV-Vis /Fluorimetry Spectroscopy



Fluorescence emission of the chromophore depends on restricted rotational motion, which is influenced by the viscosity of its environment.

To investigate this, the chromophore was dissolved in a series of glycerol : DMSO mixtures with varying viscosities.

Absorption and fluorescence spectra will be recorded to assess how viscosity affects photophysical behavior.

Acknowledgements

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