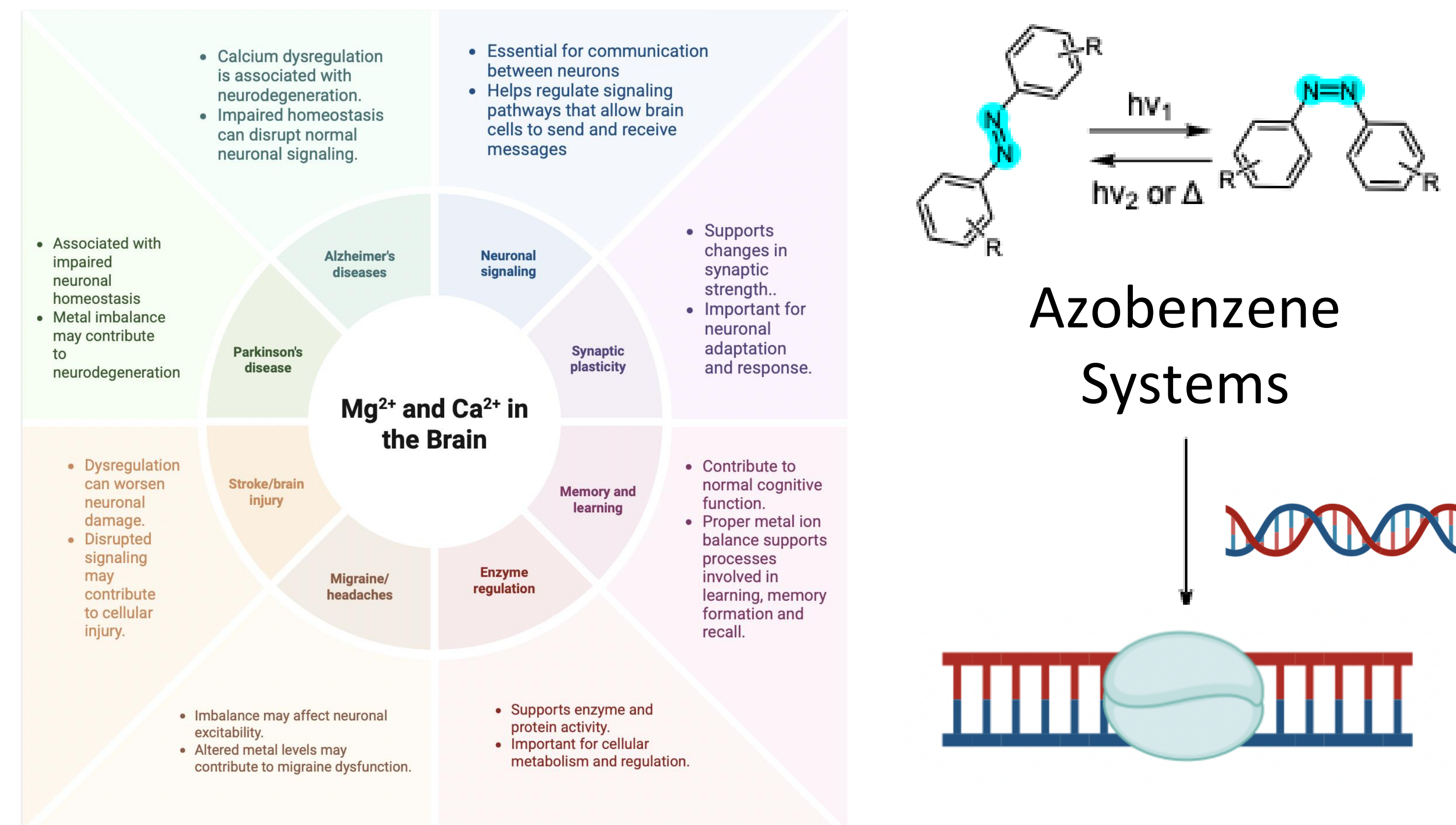


# Photoswitchable Metal Chelators

Rhea Sharma

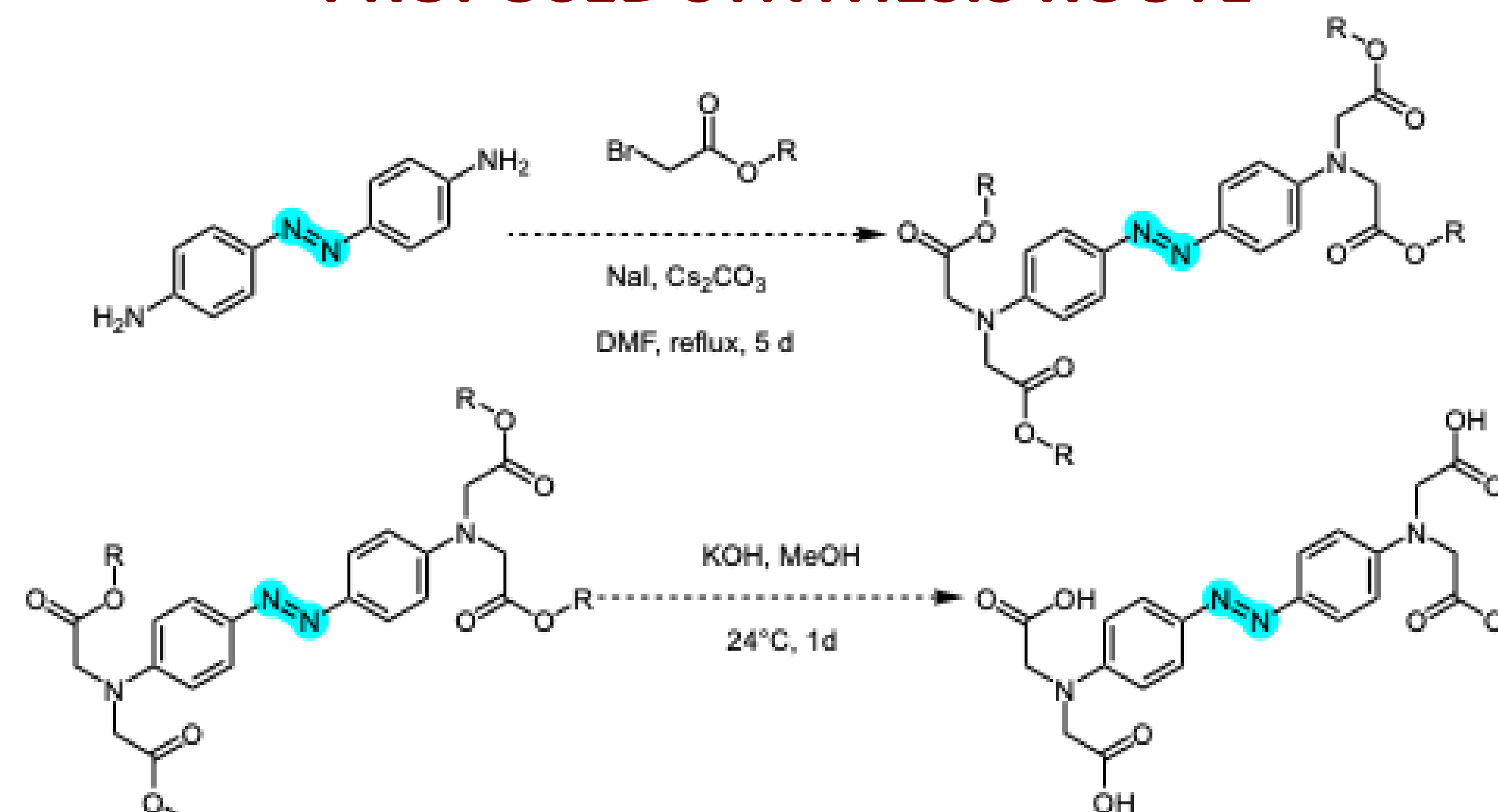
Faculty Advisor(s): Dr. Nasri Nesnas, Dept. of Chemistry and Chemical Engineering,  
Florida Institute of Technology

## INTRODUCTION



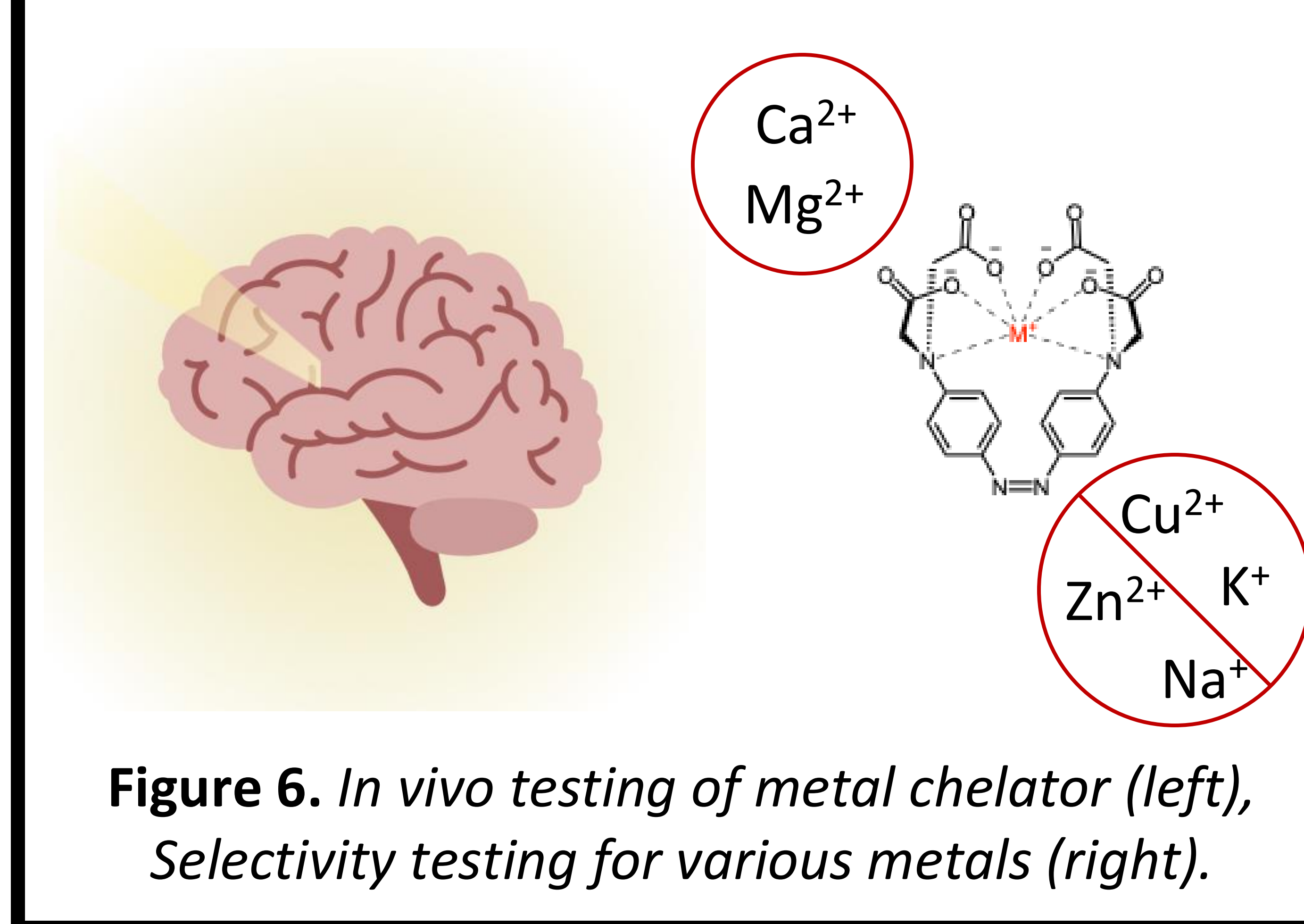
**Figure 1.** Importance of Mg<sup>2+</sup> and Ca<sup>2+</sup> in the brain (left), Previous use of photoswitchable systems (right).

## PROPOSED SYNTHESIS ROUTE



**Scheme 1.** Proposed synthesis of ester-protected and deprotected azobenzene moieties.

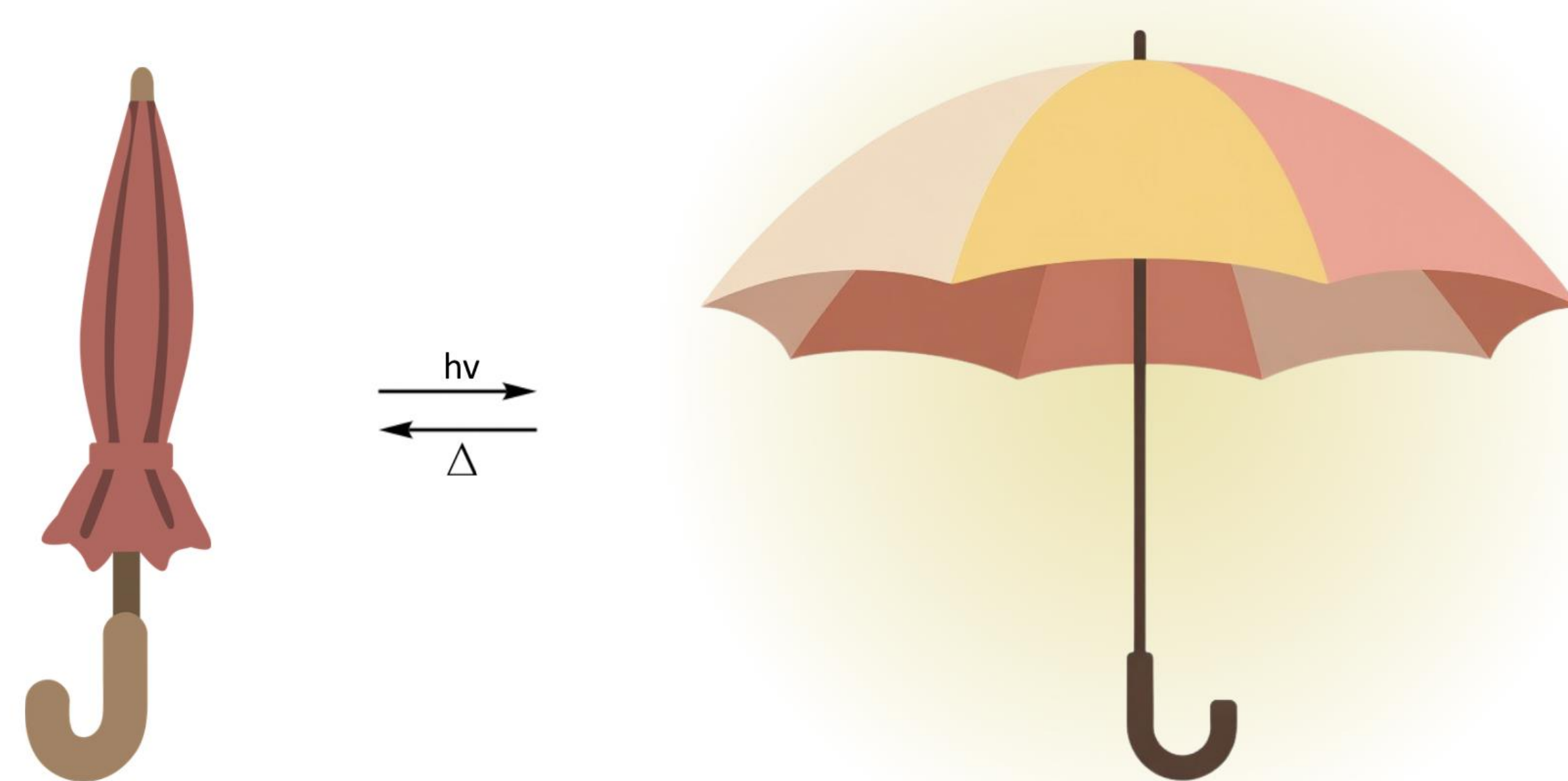
## CONCLUSION



**Figure 6.** In vivo testing of metal chelator (left), Selectivity testing for various metals (right).

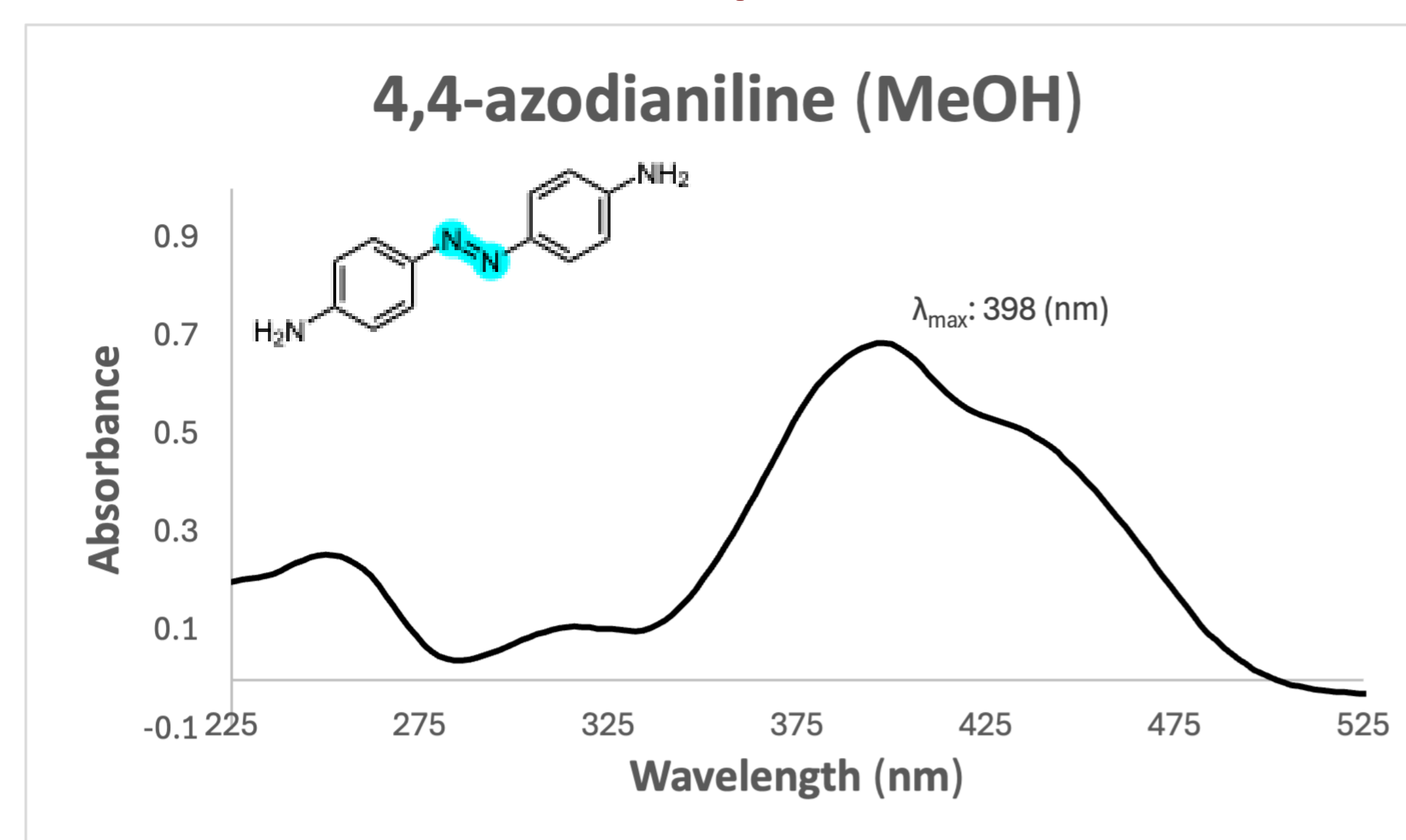
## PROJECT OBJECTIVE

Develop a light-responsive chelator that switches between OFF and ON metal-binding states, enabling spatiotemporal control of metal coordination.



**Figure 2.** Photoswitchable molecule analogy.

## UV/Vis

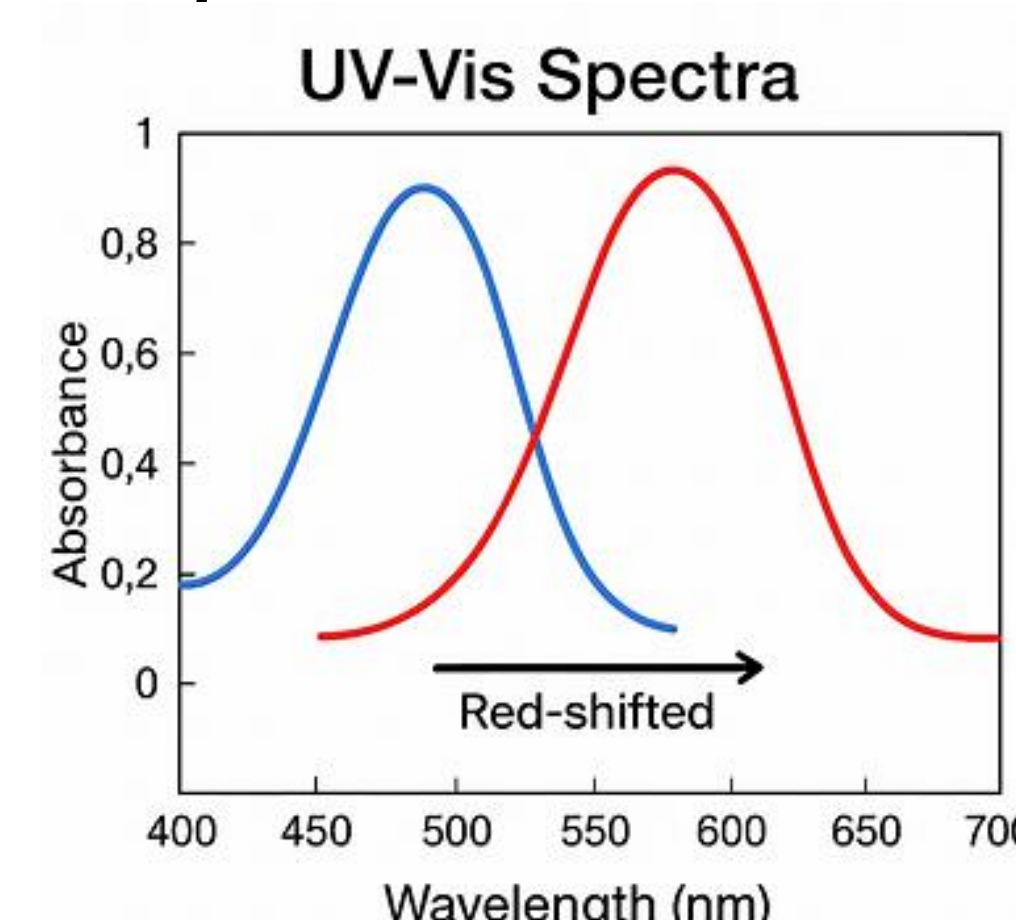


**Figure 4.** UV/Vis spectra of 4,4'-azodianiline in methanol.

## FUTURE WORK

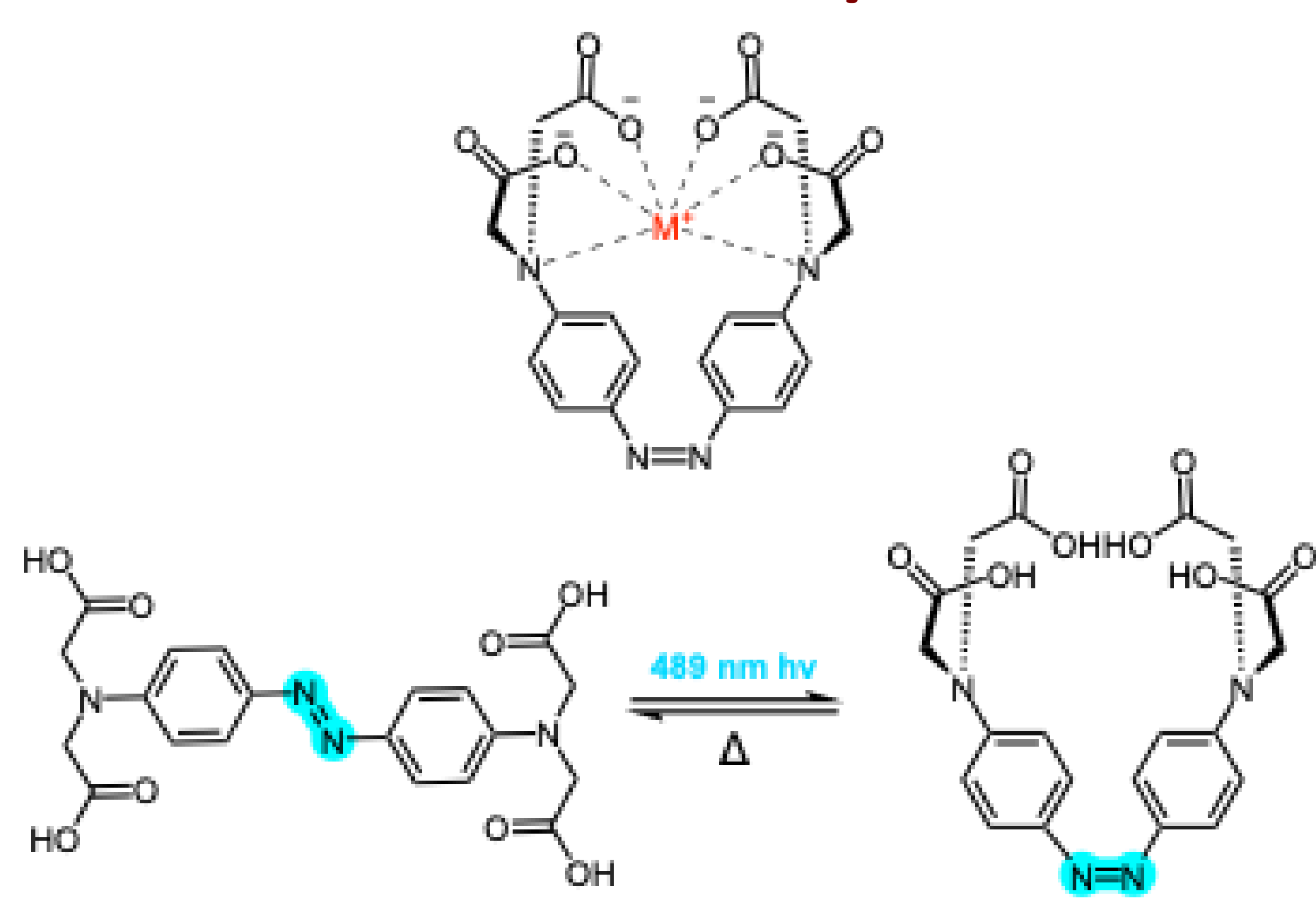


**Scheme 2.** Proposed synthesis of conjugated photoswitches.



**Figure 5.** Proposed "red-shifting" of conjugated photoswitch.

## MOLECULAR DESIGN / RATIONAL



**Figure 3.** Azobenzene metal chelation (top), Photoisomerization of azobenzene system (bottom).

## ACKNOWLEDGMENTS

I would like to sincerely thank my mentor, Julian Vlad, and my fellow researcher, Nikola Mekic, for their guidance, support and assistance throughout this project. I also thank my research lab and the Department of Chemistry and Chemical Engineering at Florida Tech for providing the opportunity to contribute to this research and present it at the Northrop Grumman Design Showcase. This work was supported by the National Institute of Health (NIH) under 9R15MH139078-03.

## REFERENCES

- [1] Patel, A. R.; Patel, G.; Gurupada, M.; Patel, S. P.; Bhattacharya, S.; Putta, A.; Banerjee, S. Directive Oxidative Azo Coupling of Anilines Using a Self-Assembled Flower-like CuCo<sub>2</sub>O<sub>4</sub> Material as a Catalyst under Aerobic Conditions. *ACS Omega* **2020**, *5* (47), 30416-30424. DOI: 10.1021/acsomega.0c03562.
- [2] Momotake, A.; Arai, T. A New Class of Azobenzene Chelators for Mg<sup>2+</sup> and Ca<sup>2+</sup> in Buffer at Physiological pH. *Tetrahedron Lett.* **2003**, *44* (39), 7277-7280. ISSN 0040-4039. DOI: 10.1016/S0040-4039(03)01863-X.