

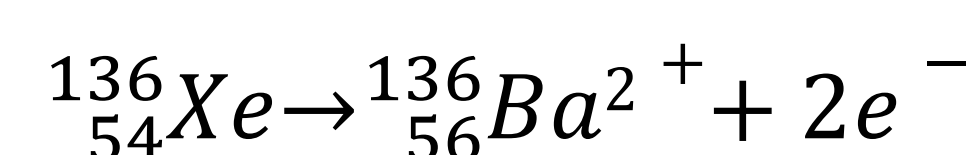
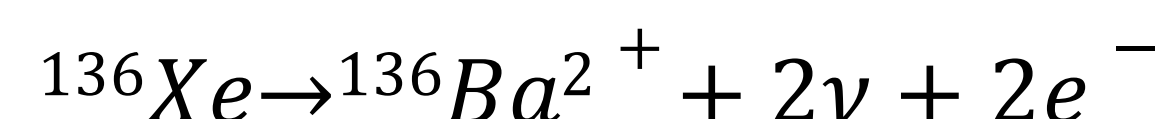
# Barium Sensing Calix[4]arene Derivatives for the Detection of Neutrinoless Double Beta Decay

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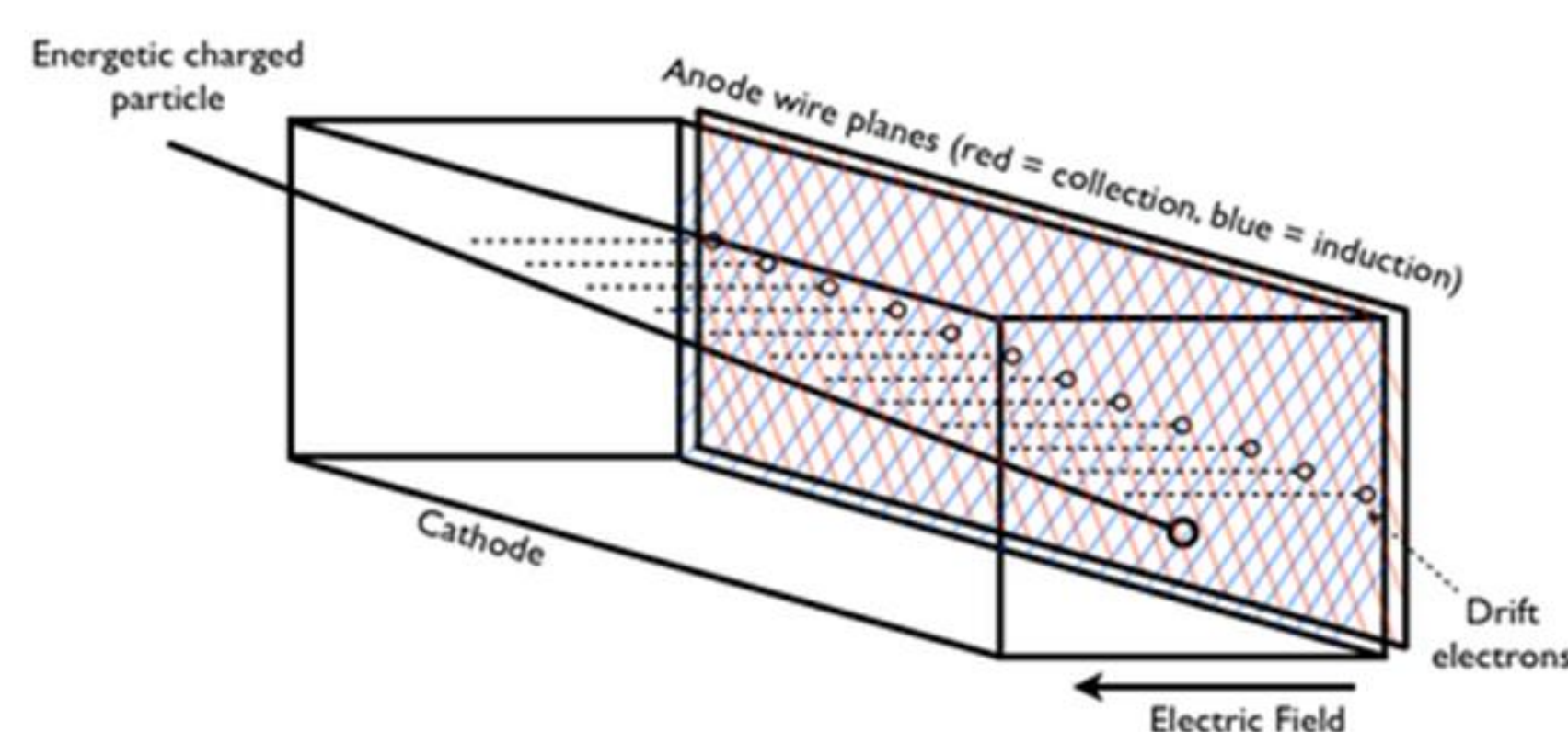
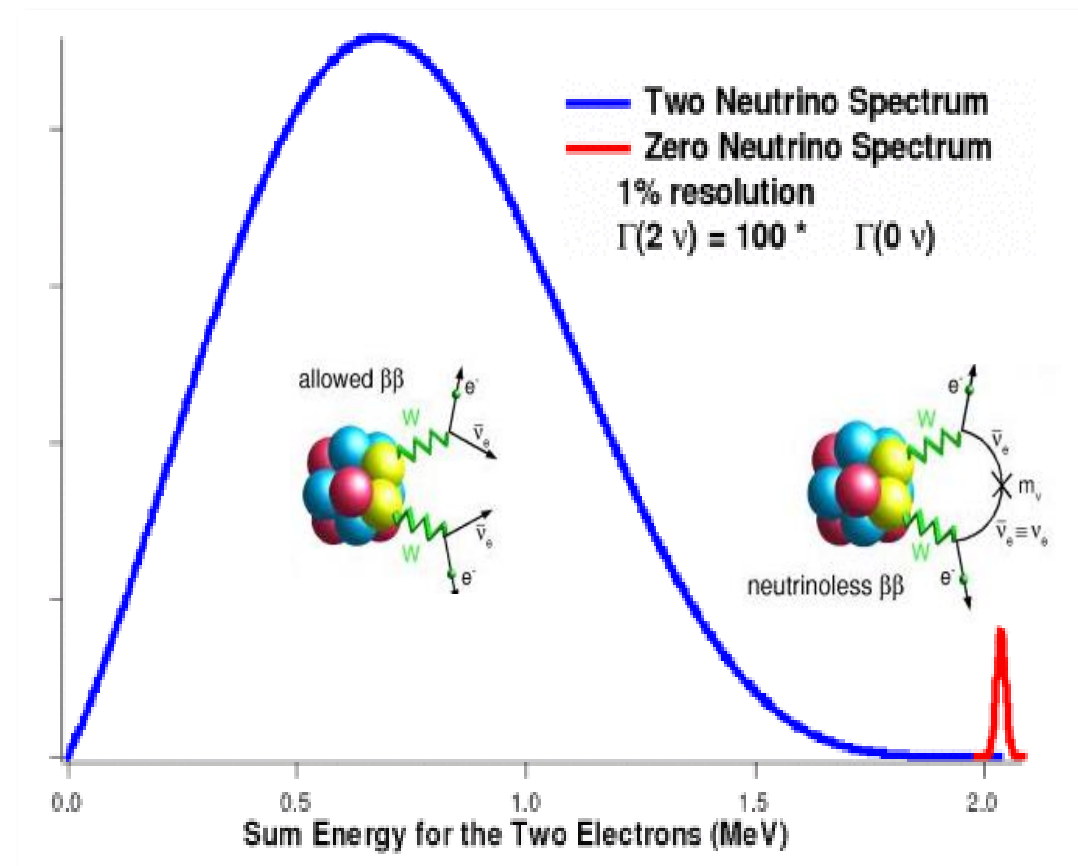
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## Introduction

Neutrinoless double beta decay is a rare nuclear process involving the spontaneous conversion of two neutrons into two protons

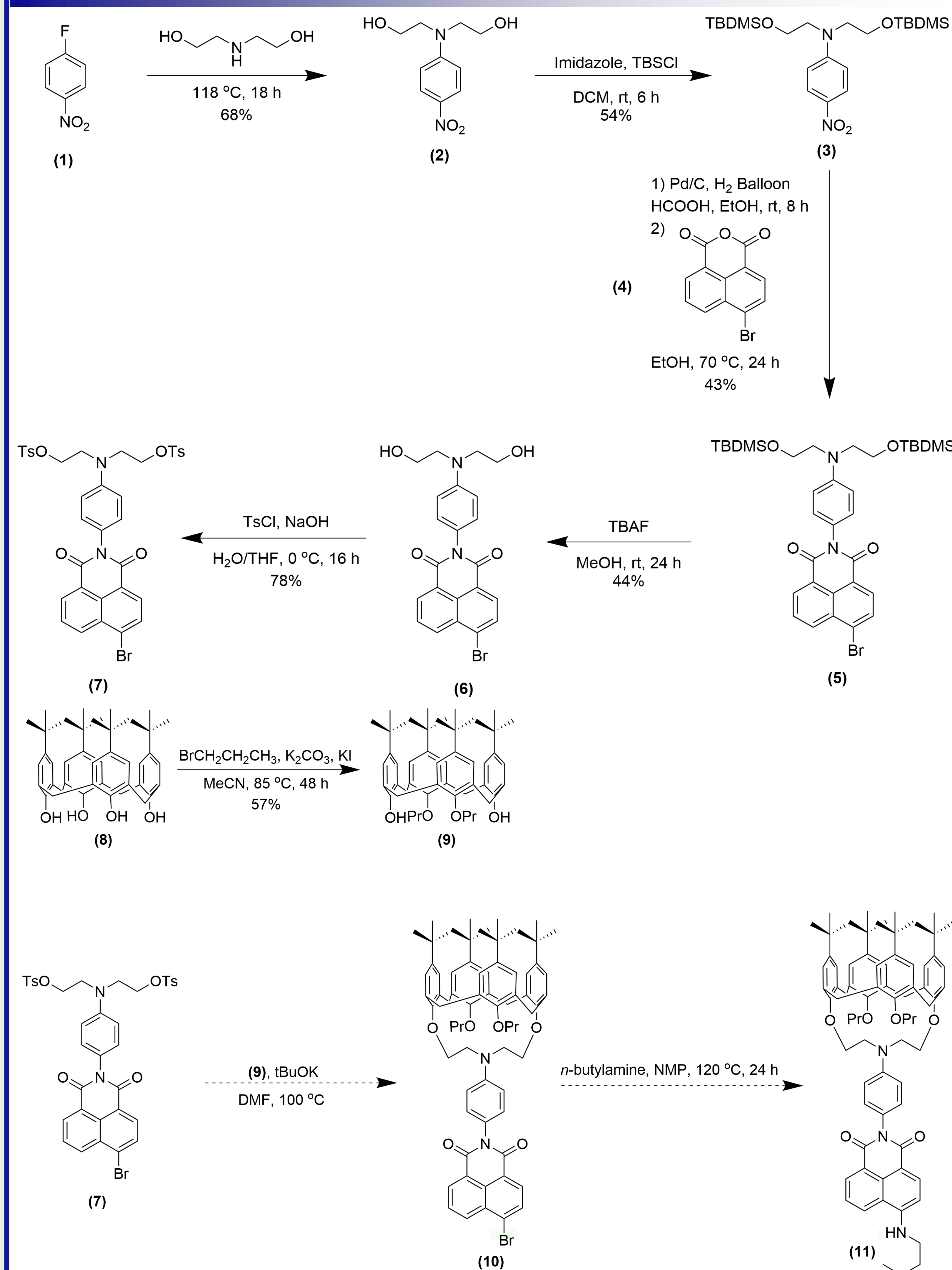


This project aims to synthesize barium sensing molecules for use in experiments that search for barium from high pressure xenon gas



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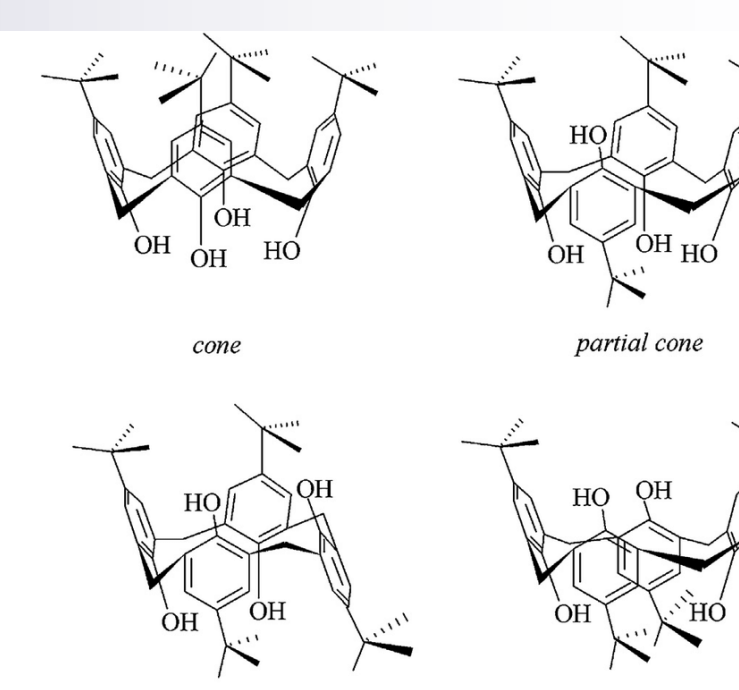
## Synthetic Pathway of Calix[4]arene



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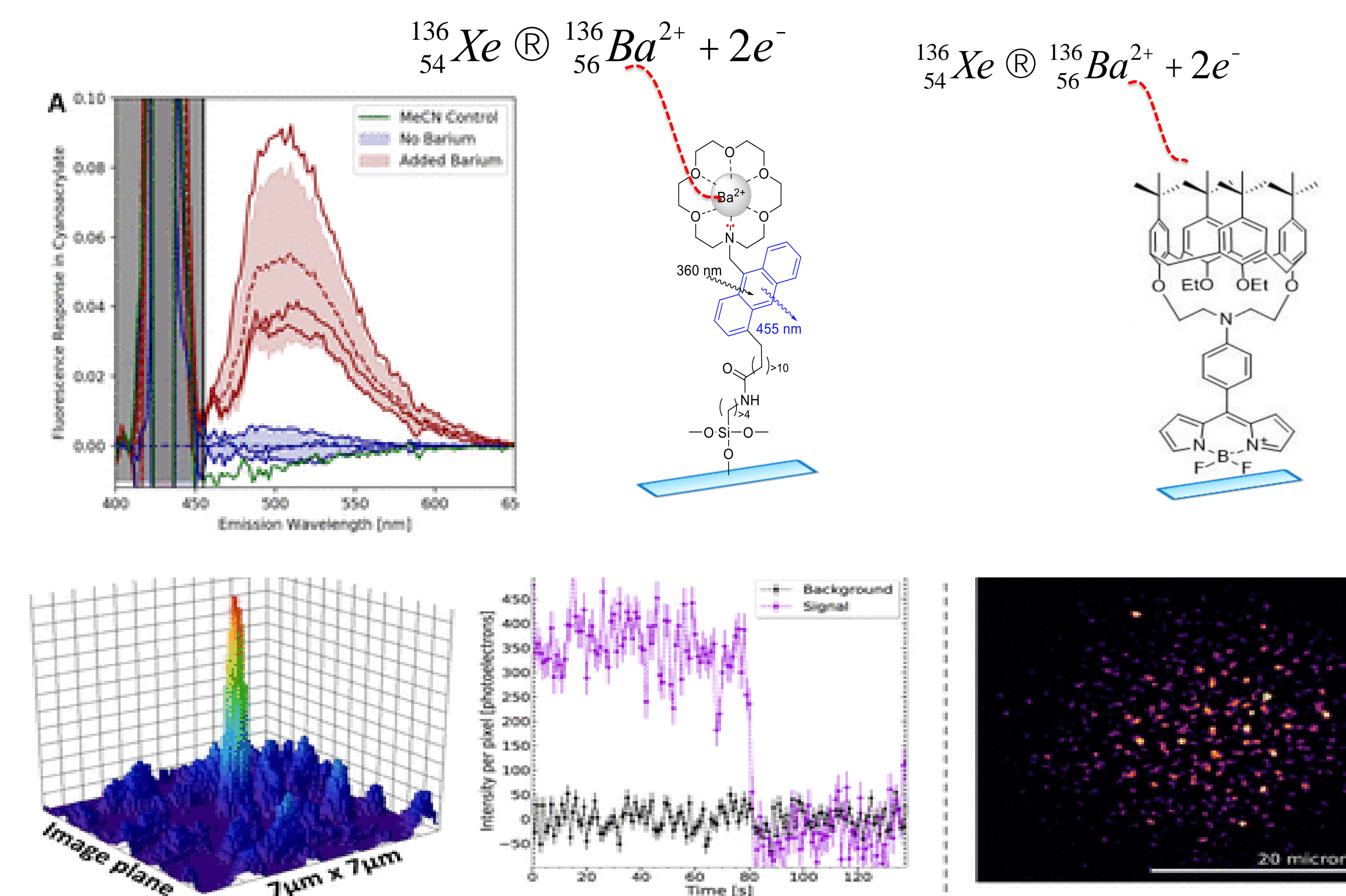
## Current Challenges

Calix[4]arene can take 4 different conformers depending on substituents on lower ring



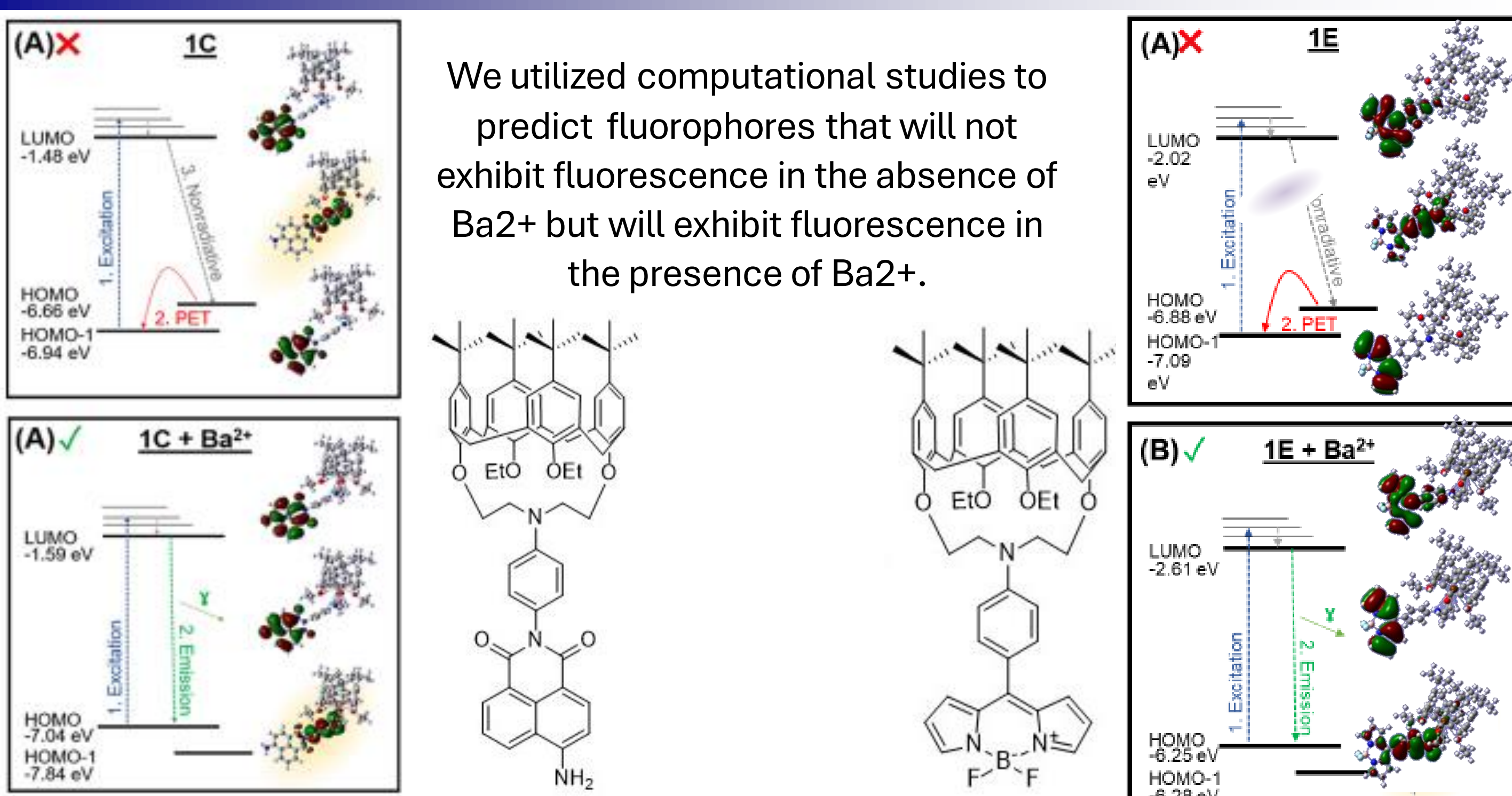
## Future Directions

The addition of  $\text{Ba}^{2+}$  enhances the fluorescence response. These systems allow single ion fluorescence



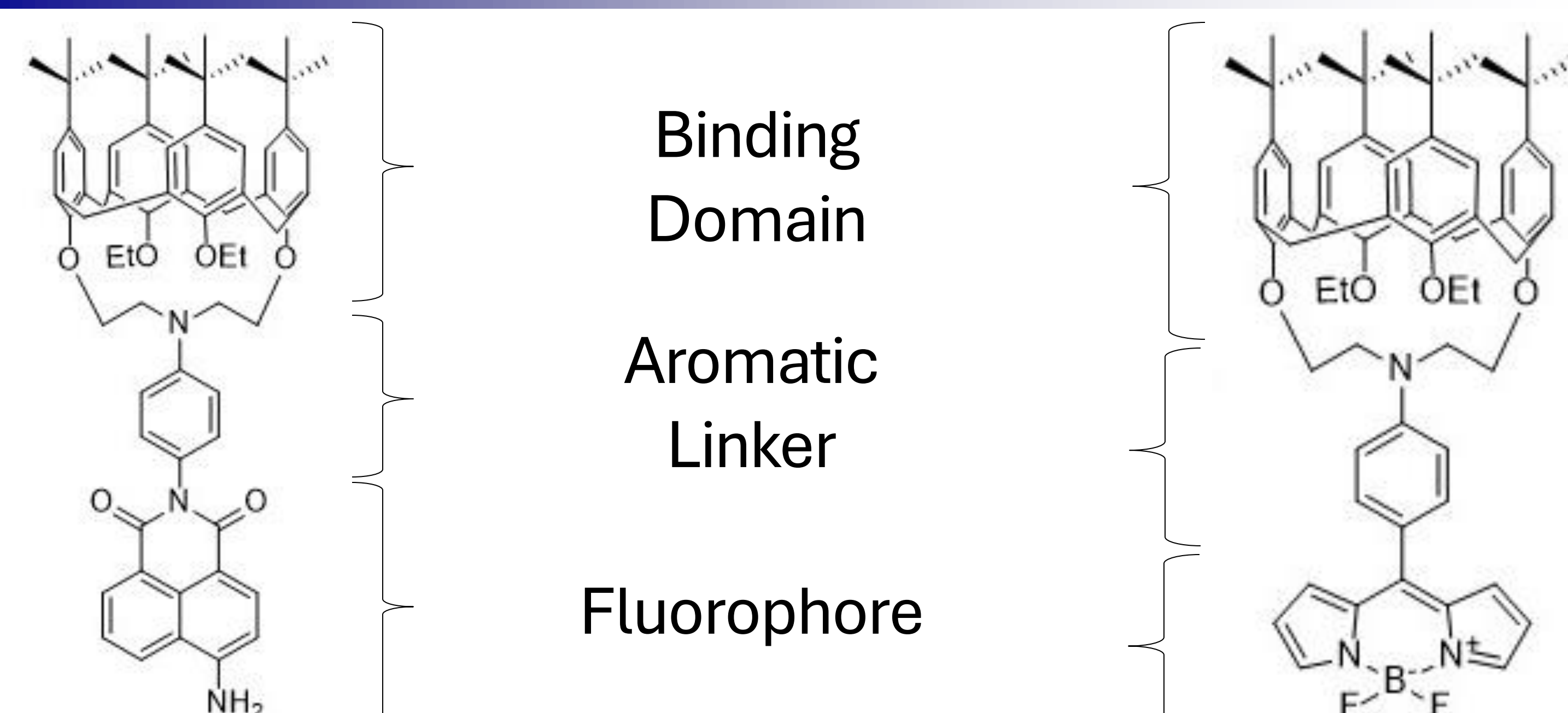
We hope that our new Calix[4]arene derived systems can improve on our previous results

## Computational Studies



We utilized computational studies to predict fluorophores that will not exhibit fluorescence in the absence of  $\text{Ba}^{2+}$  but will exhibit fluorescence in the presence of  $\text{Ba}^{2+}$ .

## Mechanism of Calix[4]arene



## Conclusions

- We have identified two calix[4]arene based heavy metal sensing compounds
- We have constructed a possible pathway to synthesizing this molecules, utilizing known chemistry in novel ways
- We aim to finish the synthesis of these molecules and test them in both dry and wet fluorescence studies in the near future.

## Acknowledgements

We want to thank our collaborators, Dr. Vuong for the computational studies, Dr. Benjamin Jones, and the NEXT collaboration. We also want to thank the NSF and Welch Foundation for funding.

## References

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