

We recently discovered a new class of highly fluorescent zwitterionic fluorophores, derivatives of which display extreme environmental sensitivity. These exciting molecules have physical properties that make them interesting candidates for utility in a range of technologies. Of interest to us is the possibility that these molecules could be used to correlate conformational changes at G protein-coupled receptors (GPCR) which are an important class of drug targets. GPCRs is often activated by several different agonists, both endogenous and as medicines. The significance of this study is that differences in GPCR conformation are thought to be related to the ability of particular agonists to elicit cellular responses. This is because the cellular response is not simply a product of GPCR occupancy, as would be expected in an “on” – “off” switch or indeed to how tightly the agonist is bound.

The project will involve the synthesis of novel fluorophores (School of Chemistry), that will be subsequently conjugated with GPCRs or their signal transducers; G-Proteins. Interaction of these fluorescent, environmentally sensitive, GPCR or G-protein conjugates will then be investigated using single-molecule dynamics with an emphasis on the utility of (Fluorescence Lifetime Imaging Microscopy – Fluorescence Resonance Energy Transfer) FLIM-FRET in addition to a suite of other techniques.

A suitable candidate will have broad interests spanning synthetic chemistry, biology, and photo-physics. The candidate will receive all the required training to conduct the project but must have a strong desire to assume ownership of the project and work independently.

**Supervisors:** Dr. Chris Ritchie ([chris.ritchie@monash.edu](mailto:chris.ritchie@monash.edu)) and Dr. Sebastian Furness ([sebastian.furness@monash.edu](mailto:sebastian.furness@monash.edu))

**Faculty / Portfolio:** School of Chemistry, Faculty of Science, Clayton Campus, Monash University AND the Monash Institute of Pharmaceutical Sciences, Parkville Campus

### Candidate Requirements:

Applicants will be considered provided that they fulfill the criteria for Ph.D. admission at Monash University and demonstrate excellent research capability. Details of the relevant requirements are available at <http://www.monash.edu/graduateresearch/future-students/eligibility2/eligibility/>

Interested Candidates that meet the requirements detailed in the previous link **MUST** submit an Expression of Interest (EOI) <http://www.monash.edu/science/schools/chemistry/postgraduate/express-interest> **AND** email both prospective supervisors. The (EOI) will contain:

A cover letter that includes a brief statement of the applicant's suitability

A curriculum vitae, including a list of any published works

A full statement of academic record, supported by scanned copies of relevant certified documentation (including transcripts)

Contact details of two academic referees and/or reference letters

Evidence of English-language proficiency (international applicants only) such as TOEFL or IETLS.

### Relevant Project References

“Highly Fluorescent Pyridinium Betaines for Light Harvesting” *Angew. Chemie. Int. Ed.*, **2017**, 56, 13882. (<https://onlinelibrary.wiley.com/doi/abs/10.1002/anie.201704832>).

“Ligand-Dependent Modulation of G Protein Conformation Alters Drug Efficacy” *Cell*, **2016**, 167, 3, 739. (<https://doi.org/10.1016/j.cell.2016.09.021>)