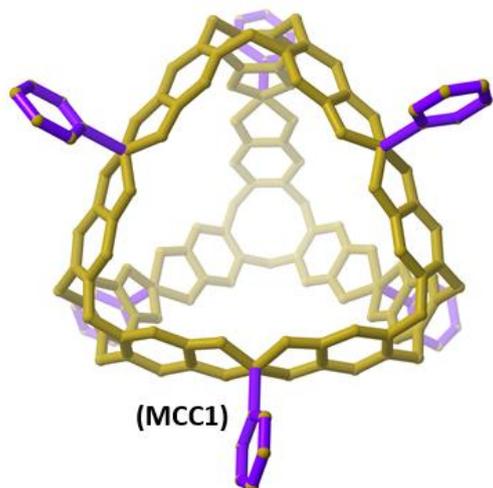


This collaborative project will target the preparation of nanoscopic molecular cages constructed from environmentally sensitive zwitterionic dyes. Using recently developed protocols we propose that stable molecular containers will be constructed that will selectively bind Cs^+ ions based on recent findings (see references). Incorporation of fluorophores with (Twisted Intramolecular Charge Transfer) TICT properties into structurally similar molecular architectures is anticipated to result in a unique fluorescence response to Cs^+ on the binding of the cations within the molecular cage. The solution state dynamics of the resulting “host-guest” complexes will be studied using spectroscopic and x-ray diffraction techniques. The justification for this study is based on the detection of Caesium ions in aqueous media due to the environmental impact of the radioactive isotope ^{137}Cs which is a major component of nuclear waste.



Furthermore, the candidate will be expected to develop and implement new methodologies towards the preparation of novel covalent molecular cages that have the potential to discriminate between other analytes such as volatile organic compounds (VOCs) in the solid state.

To achieve these project goals, we are seeking an excellent Ph.D. candidate with a passion for synthetic chemistry and a curiosity to discover new molecular materials with potential sensing properties. The candidate will receive all the required training to conduct the research but must have a strong desire to assume ownership of the project and work independently.

Key Project Activities: Inorganic and organic synthesis, Single crystal x-ray diffraction, NMR Spectroscopy, Fluorescence Spectroscopy

Supervisors: Dr. Chris Ritchie (chris.ritchie@monash.edu); A/Prof Brendan Abrahams (bfa@unimelb.edu.au); Dr. Roger Mulder (Roger.Mulder@csiro.au)

Faculty / Portfolio: School of Chemistry, Faculty of Science, Clayton Campus, Monash University; School of Chemistry, Faculty of Science, Parkville Campus, the University of Melbourne; CSIRO Manufacturing, Clayton.

Candidate Requirements:

Applicants will be considered if they fulfil 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 all 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 IELTS.

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>).

“Self-Assembly of a Si-Based Cage by the Formation of 24 Equivalent Covalent Bonds” *Chem. Commun.* **2018**, 54 (84), 11877–11880. (<https://doi.org/10.1039/c8cc06405a>)