

Bath Monash Global PhD Programme in Sustainable & Circular Technologies

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| Project Title: | Aluminium, magnesium and calcium centred Lewis acids as Earth-abundant and sustainable catalysts |
| Supervisors at Bath: | David Liptrot |
| Supervisors at Monash: | Drasko Vidovic (lead) |
| Home Institution: | Monash University |
| Indicative period at Host Institution: | 2 years at Monash; 1.5 years at Bath with exact dates to be confirmed |

Project Summary

Catalysis has and continues to be an integral part of fundamental research and, more importantly, chemical industry. Catalysed reactions, in general, reduce energy requirements, reaction times and waste formation in comparison to non-catalysed procedures. In recent years, owing to the evolution of green chemistry and sustainable development concepts, the use of Earth abundant and, hence, inexpensive elements has been the focus for catalyst preparations. Therefore, this project will be centred on the synthesis and subsequent activity of novel catalysts based on copious and inexpensive aluminium, magnesium and calcium elements. In particular, complexes containing aluminium (Monash), as the most abundant metal in the Earth's crust, will be exploited as Lewis acid catalysts because this particular field has been plagued with the presence of Brønsted acids as reported in the literature. In fact, Vidovic group has demonstrated that the use of aluminium Lewis acids resulted in unprecedented results such as polymerization of functionalised olefins, which is not trivial to execute. Furthermore, Lewis acids derived from group 2 elements (Bath) have significant potential but remain relatively underexplored. Ligand systems suitable for aluminium should be readily modified to support divalent alkaline earth cations allowing the non-directional nature of these s-block elements to be compared, contrasted to and to complement the directional Lewis acids derived from group 13.

Features of the programme

- PhD researchers will be registered at both institutions and will be awarded a joint PhD degree.
- PhD researchers will be jointly supervised by academics from both Monash and Bath Universities.
- All PhD researchers in the joint programme will also undertake a bespoke advanced training plan covering a range of topics focusing on sustainability.
- Applicants can apply to either Monash University or the University of Bath as their nominated home institution.
- PhD researchers will undertake a period of no less than 12 months at the partner institution.
- Up to four scholarships/studentships will be offered. Additional and suitably qualified applicants who can access a scholarship/studentship from other sources will be also considered. Evidence of funding must be provided.
- The scholarships/studentships include:
 - a *full tuition fee sponsorship* provided by Monash or Bath for the course duration (up to a maximum 42 months). Note, however, that studentships for Bath-based projects will provide cover for UK/EU tuition fees ONLY.

- a living allowance (*stipend*) provided by Monash or Bath Universities.

Note: Overseas Student Health Cover (OSHC) must be paid by the student, unless covered by the university.

How to apply

You MUST express interest for three projects in order of preference. Please submit your application at the Home institution of your preferred project ('Home' institution details can be found in the project summary). However, please note that you are applying for a joint PhD programme and applications will be processed as such.

The deadline to submit applications is 23rd February 2020

Monash University

Expressions of interest (Eoi) can be lodged through <https://www.monash.edu/science/bath-monash-program>. The Eoi should provide the following information:

CV including details of citizenship, your Official Academic Transcripts, key to grades/grading scale of your transcripts, evidence of English language proficiency (IELTS or TOEFL, for full requirements see: <https://www.monash.edu/graduate-research/faqs-and-resources/content/chapter-two/2-2>), and two referees and contact details (optional). You must provide a link to these documents in Section 8 using Google Drive (Instructions in Section 8).

University of Bath

Please submit your application through the following link: <https://www.csct.ac.uk/bath-monash-global-phd-programme/>

Please make sure to mention in the "finance" section of your application that you are applying for funding through the joint Bath/Monash PhD programme for your specified projects.

In the "research interests" section of your application, please name the three projects you are interested in and rank them in order of preference. Please also include the names of the Bath lead supervisors.