Centre for **Sustainable** Chemical Technologies

MONASH University

UNIVERSITY OF BATH

Bath Monash Global PhD Programme in Sustainable Chemical Technologies

Project Title:	Development of Analytical Methods for Enantioselective Assessment of Licit and Illicit Drugs
Supervisor at Bath:	Prof Barbara Kasprzyk-Hordern
Supervisor at Monash:	Professor Philip Marriott (lead)
Home Institution:	Monash University
Indicative period at Host Institution:	12 months with exact dates to be confirmed

Project Summary

Project Background: Although enantiomers essentially have the same chemical and physical properties, in living systems they elicit quite different properties. For flavours, one enantiomer may have a strong odour response whilst the other may be inactive, due to different interactions with sensory receptors. For drugs, one enantiomer may be toxic or psychoactive; the other non-active. The (*R*)-enantiomer of ecstasy has a slower elimination half-life that the (*S*)-enantiomer. Assessment of molecular chirality is required if the activity of enantiomers is to be quantified. Analytical methods directed to quantify these enantiomers today invariably rely upon use of chiral separation media in chromatographic methods, rather than prior synthesis of diastereomers. Assessment of chirality can also be a potent method to track the source of illicit drugs, and may be used for identification of supply chain. Rarely do police forensic methods extend to identification of chiral signature of actives, but there is interest in assessing street drugs for the active component.

This Project: This project will apply leading-edge separation technologies with the informing power of mass spectrometry to develop new capabilities for general enantioseparations of illicit drugs such as amphetamines and new psychoactive substances (e.g. cathinones). Both HPLC and GC methods will be of interest, with the latter focussed on use of novel strategies in multidimensional separations for profiling of drugs from natural and synthetic sources. Chiral HPLC separation will utilise both low resolution mass spectrometry (triple quadrupole) as well as high resolution quadrupole time-of-flight technology.

Facilities and Capabilities: University of Bath (BK-H) has access to HPLC and MS facilities (both low resolution mass spectrometry (triple quadrupole) for targeted analysis and high resolution QTOFMS for non-target analysis) and capabilities in enantiomeric analysis, with prior studies in assessing chiral drugs, including illicit substances. Monash University (PM) has advanced MDGC and MS – QQQMS and QTOFMS – facilities, used recently to assess natural chiral signatures in natural products, profiling of ecstasy synthesis procedures, and forensic drug analysis in collaboration with Victoria Police, with interest in portable GC–MS technology for on-site drug profiling.

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 Bath (home or EU students only) or Monash for the course duration (up to a maximum 42 months)
  - *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.

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How to apply

Please express interest for up to three projects in order of preference. Please submit your application at the Home institution of your preferred project. 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 Sunday 12 May.

Monash University

Expressions of interest (EoI) can be lodged through https://forms.gle/XkC1TKpqVQh4B4N1A. The EoI should provide the following information:

CV including details of citizenship, full transcripts of academic records, evidence of English language level (IELTS or TOEFL), nominate your host institution (ie Bath or Monash), two referees and contact details, indication of which projects are of interest.

University of Bath

Please submit an application through the following link: https://samis.bath.ac.uk/urd/sits.urd/run/siw_ipp_lgn.login?process=siw_ipp_app&code1=RDUCH-MO01&code2=0001

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 up to three projects you are interested in and rank them in order of preference. Please also include the names of the Bath lead supervisors.