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.