

Professor Philip Marriott

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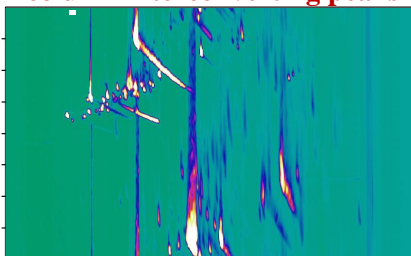
This document provides an idea of the type of research we undertake in my group. If you have further queries on these or related projects, please do not hesitate to contact me (details above).

More information: <http://www.monash.edu/science/schools/chemistry/our-people/staff/marriott>

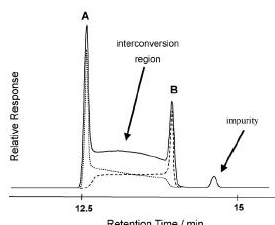
General area of project interests

The Marriott Group specialises primarily in Analytical Chemistry, and specifically Separation Science / Chromatographic methodology, supporting by a broad repertoire of applications studies. We develop new methods in GC, including comprehensive two-dimensional GC (GC×GC), and multidimensional GC (MDGC), using a range of specific detection technologies, including mass spectrometry. We study ultrahigh resolution separations, unusual processes in GC, and extend the chromatography analysis to complex samples. Recently, two GC- triple quadrupole MS systems were delivered; we have access to a GC-Q-TOFMS, and cold EI. These transform our studies, and with our MDGC research we now lead the world.

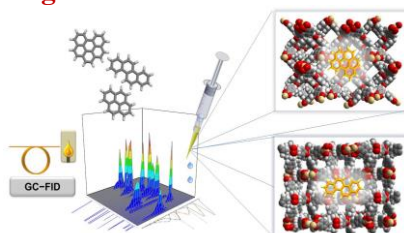
[A] 2D GC of myrrh oil showing on-column interconverting peaks



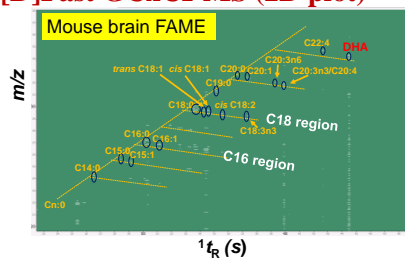
[B] Interconversion in GC gives unusual shapes; calculate ΔE



[C] Construct MOF GC phases; target molecular interactions



[D] Fast GC×CI-MS (2D plot)



Description of Example Project Area(s)

Profiling, Chiral analysis, or Interconversion Studies in essential oils (EO): Chiral compound analysis can be used to authenticate the source of EO and to check for adulteration of the oil (e.g. lavender); we recently completed a study to authenticate *Melaleuca* oils. Studies in this area include (i) methods for authentication of Manuka honey and fingerlime, which is a joint study with the *Royal Botanic Garden*; and (ii) the study of a unique interconversion process [A] in myrrh, frankincense, agarwood and similar oils using a novel hybrid multidimensional GC method; we will develop and apply this new technology.

Novel interconversion-reaction processes in gas chromatography: Interconverting molecules lead to fascinating peak shapes in GC [B]; we will investigate a number of interconverting model compounds including essential oils to derive fundamental properties based on molecular fitting equations.

Studies in Ionic Liquid & Metal Organic Framework (MOF)-based stationary phases: MOF and IL phases [C] offer a number of unique properties for separations in gas chromatography; GC columns will be prepared in this project and be evaluated according to their ability to provide separation performance unlike the usual retention mechanisms of other GC phases.

Studies in soft, hard and cold ionisation in GC-MS analysis: The use of the correct ionisation process in GC is critical for precise and accurate identification of compounds through library searching. New types of presentation methods such as GC×MS with soft ionisation (e.g. CI [D]) give intriguing possibilities. We will apply a range of ionisation methods – hard EI, soft CI, & cold EI to investigate new applications and novel presentation formats for GC-MS analysis with an aim to identification and quantitative analysis.