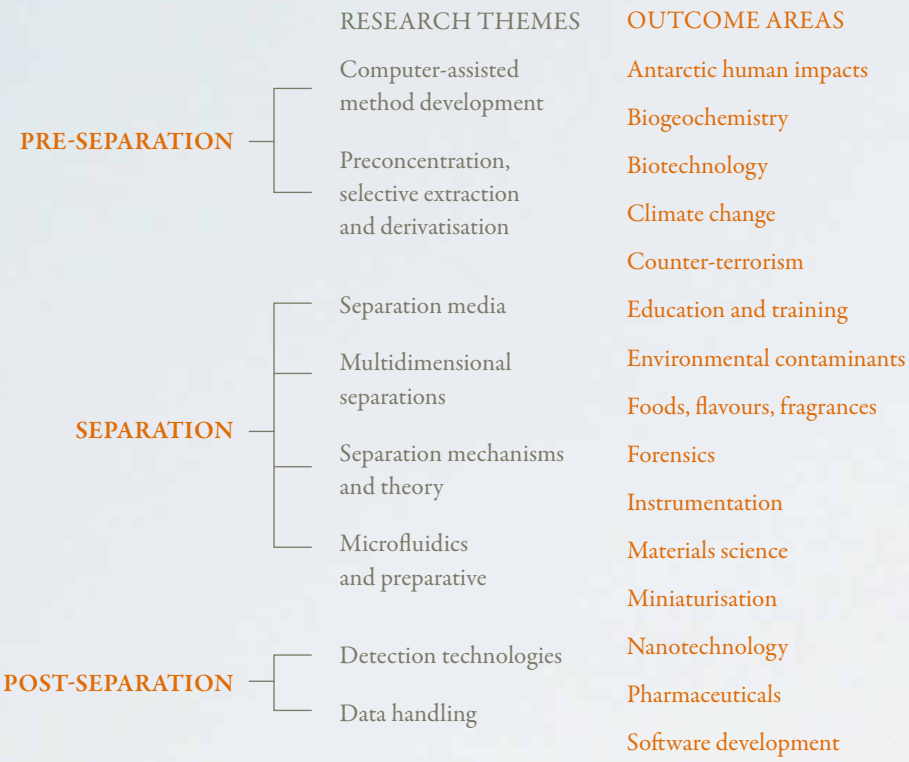
ACROSS ANNUAL REPORT 2011

ACROSS
UTAS
RMIT UNIVERSITY
University of Western Sydney

INSIDE THE 2011 report

ACROSS RESEARCH structure



introduction to ACROSS

Separation science involves the study of fundamental processes and materials for the separation and subsequent measurement of specific molecules, usually when these are present in very complex mixtures. It finds use in all of the chemical and biological sciences and in many areas of engineering.

Advances in separation science have provided the impetus for exciting new developments in the biological sciences (e.g. genomics, proteomics and medicine), pharmaceutical sciences (e.g. drug discovery and characterisation), environmental sciences (e.g. ultra-trace residue analysis), forensic science (e.g. illicit drugs, DNA fingerprinting, and explosives residues) and other areas. The discovery of new modes of separation science involving analysis, characterisation and purification will be essential to these fields. Separation science also bridges the nanoscale through to the macroscale, with common elements of theory and implementation. Advances in separation science will therefore be an important driver behind a very broad spectrum of Australian science, ranging from new developments in nanotechnology to novel biomaterials. Its importance as an enabling science cannot be overstated.

The Australian Centre for Research on Separation Science (ACROSS) was established in 2001 as a strategic agreement between key researchers at the University of Tasmania and RMIT University (with University of Western Sydney joining ACROSS in 2008) to form a consortium of prominent Australian researchers in separation science. This consortium was supported financially by the participating institutions to pursue the following aims:

(i) maintain an outstanding level of international renown in research on separation science,

(ii) coalesce and enhance Australian research on separation science into an organised structure operating with a coordinated research plan which addresses and exploits the most exciting and innovative themes in modern separation science,

(iii) provide enabling research and research training of the highest quality which supports and advances all major areas of Australian science.

Australian research in separation science has long enjoyed an excellent international reputation, earned by the individual activities of talented researchers. ACROSS offers an organisational and resource base through which these individual researchers can work in a coordinated and synergistic manner under a series of structured and interlocking research programs. This avoids duplication of effort, allows resources and expertise to be shared and value-added opportunities to be provided broadly to industry, academia and the nation, and also establishes much needed national training facilities in separation science.

Research in ACROSS has been established using focused research themes to provide both fundamental and applied research outcomes in separation science. ACROSS draws together multi-institutional, internationally prominent and genuinely collaborative research teams, having complementary skills and synergistic resource-base expertise, and committed to focused programs of national significance. The research structure listed opposite groups research themes using the three major phases of a separation and also shows the major outcome areas in which these themes are being applied.

DIRECTOR'S report

I am pleased to present this report on the activities of ACROSS in 2011.

In 2011, the management team of ACROSS included myself, Professor Paul Haddad, as Director of the Australian Centre for Research on Separation Science (ACROSS) and Chair of the ACROSS (UTAS) Management Committee, with Associate Professor Gregory Dicinoski as the Deputy Director (UTAS node). This section of the report provides a general overview of ACROSS in 2011, including achievements, research and statistics. More detailed information can be found within the report.

Staffing changes

Various staff changes took place in 2011. Professor Brett Paull joined ACROSS from Ireland as a New Stars Professor, Dr Dimitar Mitev as an ARC funded Postdoctoral Research Fellow, and Dr Tom Kazarian and Dr Andras Gaspar as Postdoctoral Research Fellows within the Pfizer Analytical Research Centre (PARC). Visitors spending significant periods of time in ACROSS for 2011 included Dr Hernan Cortes, Dr Ekaterina Nesterenko, Dr Marketa Ryvolova and Dr Matthew Linford. In addition, there were several international PhD students who conducted part of their research projects in ACROSS, most notably a large contingent from the Irish Separation Science Cluster, Dublin, who visited for periods of up to 3 month each throughout the year.

Research outcomes

In 2011, ACROSS continued to expand its program of fundamental and applied research, with a wide range of individual and collective research projects being undertaken. These research topics and their associated outputs are listed in full within this report. As in previous years, the research focus within ACROSS had a strong element of materials development, with an on-going programme in the development of monolithic polymer phases, and new projects in inorganic materials for future stationary phases. The application of ACROSS technology and methodology in the area of counter-terrorism continued to be a strong focus in 2011, as was the development and application of electrophoretic technology and micro-fluidic platforms, multi-dimensional approaches to complex systems, and retention modelling.

Funding

Funding for ACROSS in 2011 totalled $4,407,080, with $2,011,645 (46%) coming in the form of 14 active competitive grants from the Australian Research Council (ARC) [1 Federation Fellowship, 2 Future Fellowships, 9 Discovery Grants, 2 Linkage Grants]. Additional financial support was provided through a large range of organisation and industries, with major contributors being the University of Tasmania, government bodies, and the National Security, Science and Technology Branch of the Australian Federal Government, for counter-terrorism research.

Achievements

ACROSS staff continue to feature prominently on the international separation science scene. Members of staff held three editorships of international journals in 2011, and also appeared on the editorial boards of no fewer than 18 other journals in the area of analytical chemistry or separation science. In 2011, researchers from within ACROSS made plenary, keynote and invited presentations at most of the major international conferences and symposia on separation science.

A number of other notable achievements by ACROSS staff occurred in 2011. Associate Professor Emily Hilder was promoted to Professor, and Dr Michael Breadmore, Dr Greg Dicinoski, and Dr Joselito Quirino were all promoted to Associate Professor. Professor Paul Haddad was the first Australian recipient of the esteemed Marcel Golay Award for Research Excellence in Chromatography. The Golay Award is a major international award that recognises lifetime achievement in the field of capillary chromatography. Professor Paul Haddad also received a RACI Applied Research Award, and was a Eureka Award Finalist as an Outstanding Mentor of Young Researchers. Associate Professor Michael Breadmore was a Eureka Award Finalist in the Young Researchers field, and received the inaugural UTAS Vice-Chancellors' Award for Outstanding Contributions to Research and Research Training. Associate Professor Greg Dicinoski received a Vice-Chancellors Awards for Outstanding Contributions to Student Learning. Lastly, Robert Shellie received a UTAS Award for Research and secured a finalist position in the Scopus Young Researcher Award 2011.

Pfizer Analytical Research Centre (PARC)

Pfizer, the world's largest research-based pharmaceutical company, established in 2007 a new collaborative research centre entitled the "Pfizer Analytical Research Centre" (PARC), at The University of Tasmania, Hobart, Tasmania. Research in PARC targets innovation and enhanced productivity in the pharmaceutical analytical sciences. The aim has been to produce advancements in the analysis of pharmaceuticals through high-throughput, faster, and smarter analytical systems, thereby allowing these products to be brought to the marketplace earlier and in a more cost effective and 'green' manner.

The PARC multidisciplinary collaboration creates a Centre of Excellence for the development of novel pharmaceutical analytical methods by combining the expertise of ACROSS with that of world-leading pharmaceutical scientists from Pfizer. This multi-million dollar centre brings economic and financial gain to both the University of Tasmania and to the State of Tasmania. Pfizer, through a $3.5m investment, has funded the appointment of research staff and students, purchase of equipment and the provision of running costs for the various projects. The University of Tasmania has contributed $850k for the construction of the state-of-the-art, world-standard, purpose-built laboratory comprising 450 m^2 of instrumental bench and office space, in which PARC is housed. The Tasmanian State Government, through the Department of Economic Development and Tourism, has contributed $267k for scholarships to facilitate the recruitment of international PhD students. This contribution has enabled ACROSS to recruit high calibre students from many different countries throughout the world.

In 2011, the Centre comprised of 14 staff and students, including scientists and technical employees. These personnel include a Director, Deputy Director, 4 post-doctoral fellows, 4 research higher degree (PhD) students, and a technical officer, with additional contributions from current ACROSS staff. Each Pfizer project involves close collaboration between ACROSS researchers and Pfizer scientists located in the UK or at various sites within the USA.

The 2011 projects within PARC are:

- HPIExC – Retention of small organic molecules
- Miniaturisation of the bioanalytical process
- High performance ion-exchange stationary phase for biomolecules
- Development of immobilised enzyme monoliths for sample preparation and analysis of glycans
- Non-discriminatory, universal and sensitive detection technologies for fluid based separation techniques in the pharmaceutical industry
- Monolithic polymers for blood collection
- Predication of robust methods for QbD DoE data

I thank all staff and students for their contributions to ACROSS in 2011 and wish them every success in the coming years.

Professor Paul R. Haddad FAA, FTSE, FRACI, FRSC, FFACS
Director

2011 ACROSS Performance at a Glance

Node	Research staff	PhD, MSc students	BSc Hons students	Grants ($)	Publications	Conference presentations
UTas	22	32	1	3,548,808	58	42
RMIT/Monash	3	10	0	360,386	14	20
UWS	3	12	1	497,886	9	8
ACROSS total	**28**	**54**	**2**	**4,407,080**	**81**	**70**

KEY personnel

Professor Paul Haddad

DSc, PhD, BSc(Hons), DipMilStud, FAA, FTSE, FRACI, FRSC, FFACS

ARC Federation Fellow,
Distinguished Professor of Chemistry,
University of Tasmania,
Director, ACROSS

Paul Haddad obtained the degrees of BSc, PhD and DSc in analytical chemistry from the University of New South Wales. He is currently a Professor of Chemistry and ARC Federation Fellow at the University of Tasmania, and the Director of ACROSS. His research interests lie predominantly in theoretical aspects and applications of separations of inorganic ions using the techniques of ion chromatography, capillary electrophoresis, and capillary electrochromatography. He is editor of *Journal of Chromatography A*, a contributing editor of both *Trends in Analytical Chemistry* and *Encyclopedia of Separation Science*, and is a member of the editorial boards of eight other separation science and analytical chemistry journals.

Professor Philip Marriott

PhD, BSc(Hons), FRACI, FFACS

Professor of Chemistry, Monash University;
Distinguished Visiting Professor,
Chung-Ang University, Korea.
Deputy Director, ACROSS, (Monash)

Philip Marriott has degrees of BSc(Hons) and PhD from La Trobe University. He is Professor of Chemistry at Monash University and a Deputy Director of ACROSS. His research is primarily in the area of high resolution separation, in the fields of multi-dimensional and comprehensive two-dimensional gas chromatography, capillary electrophoresis, the use of selective detection including mass spectrometry in gas chromatography, micro-fluidics and cryogenic methods. He is a member of the editorial boards of the following international journals: *Journal of Chromatography A*, *Journal of Separation Science*, *LCGC Europe, LCGC Asia Pacific*, and *Analytical Chemistry's* News and Features Advisory Panel.

Associate Professor Andrew Shalliker

DSc, PhD, BSc(Hons)

Associate Professor,
University of Western Sydney
Deputy Director, ACROSS (UWS)

Andrew Shalliker has the degrees of BSc(Hons), PhD and DSc from Deakin University. He is currently Associate Professor in the area of analytical chemistry within the School of Natural Sciences at the University of Western Sydney and the head of the UWS node of ACROSS. His research interests are in the field of high resolution separations in liquid chromatography, which entails aspects of column and stationary phase design, multidimensional high-performance liquid chromatography, and fluid dynamics.

Dr Greg Dicinoski

PhD, BAppSci(Hons), FRACI CChem

Associate Professor, University of Tasmania
Deputy Director, ACROSS
Head of School, Chemistry (UTAS)

Greg Dicinoski holds the degrees of BAppSci(Hons) and PhD from the University of Central Queensland. He is currently a Senior Lecturer and Head within the School of Chemistry at the University of Tasmania, and is a Deputy Director of ACROSS. His research is in the general areas of analytical chemistry, separation science, environmental chemistry, and hydrometallurgy, along with synthetic and computational chemistry. Specific focus is given to theoretical aspects such as the simulation of retention and mobility in separation science techniques, forensic and national security applications employing separation science techniques, the development of novel, miniaturised, field deployable and portable chromatographic platforms, and specialist applications for the separation of inorganic and organic ions using ion chromatography and capillary electrophoresis for the solution to real-world problems.

Dr Dario Arrua

PhD, BSc(Hons)

ACROSS Postdoctoral Research Fellow,
University of Tasmania

Dario Arrua graduated from the National University of Córdoba in Argentina, where he obtained his BSc (2003) and PhD (2009). Before joining ACROSS in August 2010, he had a postdoctoral position at the National University of Santiago del Estero (Argentina), working in the development of polymeric materials with antiradical activity. His current research interests are related with the synthesis and chemical surface modification of macroporous polymers, to be used as stationary phases for the separation of biomolecules.

Dr Andrew Bowie

PhD, MSc, BSc(Hons), MRSC

Senior Research Scientist,
Antarctic Climate and Ecosystems
Cooperative Research Centre and
School of Chemistry, University of Tasmania

Andrew Bowie holds the degrees of BSc and MSc from the University of Leeds and the University of Manchester in England. He then conducted his PhD research at the University of Plymouth. In 2006 he commenced a new position as Senior Research Scientist at the University of Tasmania, working jointly in the 'Ocean Control of CO_2' subprogram in the Antarctic Climate and Ecosystems Cooperative Research Centre (ACE CRC) and ACROSS. His research interests lie in the general fields of environmental analytical chemistry and chemical oceanography, with specific emphasis on trace metal chemistry in aquatic systems. His research is strongly focused on the development of novel analytical methods to answer key questions in marine biogeochemistry.

Associate Professor Michael Breadmore

PhD, BSc(Hons)

ARC QEII Fellow, University of Tasmania

Michael Breadmore was awarded his PhD from the University of Tasmania, after which he held postdoctoral positions at the Microchip Electrophoresis Laboratory at the University of Virginia (USA) and the Institute of Clinical Pharmacology, University of Bern (Switzerland). He has also been Project Leader in Microfluidics for DeltaDOT, an Imperial College London Biotechnology spin-out company. He has extensive research interests in the development of miniaturised analytical separation technology with integrated sample preparation, with applications in drug monitoring, forensics, medical diagnostics and environmental monitoring. He is a member of the Editorial Board of *Electrophoresis*.

Patrice Castignolles

PhD, MSc

Lecturer, University of Western Sydney

Patrice Castignolles graduated at the National Graduate School of Chemistry of Paris and the University Pierre et Marie Curie (Paris VI). After a post-doctoral stay at the Max Planck Institute for Polymer Research, he was an ARC international research fellow at the Key centre for Polymer and Colloids (University of Sydney), followed by a research fellow at the Centre for Nutrition and Food Science (The University of Queensland) and the Institute of Physical Chemistry (Johannes Gutenberg University, Mainz, Germany). He investigates the mechanism of separation of branched polymers (polyacrylates, starch) by size-exclusion chromatography (SEC, also known as GPC). His current research at UWS focuses on capillary electrophoresis in the critical conditions to characterise the structure of polysaccharides (chitosan) and smart polymers (polyacrylates for drug delivery).

Dr Gary Dennis

PhD, BSc(Hons),

Senior Lecturer,
University of Western Sydney

Gary Dennis has the degrees of BSc(Hons) and PhD from Sydney University. He is currently a Senior Lecturer in the area of physical chemistry within the School of Natural Sciences at the University of Western Sydney. His research interests are in the field of polymer chemistry, synthesis and characterisation, including the use and development of size exclusion methods of separation.

Dr Viktor Drgan

PhD, BSc(Hons)

ACROSS Postdoctoral Research Fellow,
University of Tasmania

Viktor Drgan obtained his PhD in 2010 from the University of Ljubljana, Slovenia. During his PhD studies, he was mainly focused on the modelling of ion chromatography separations. After completing his PhD, he joined ACROSS as a postdoctoral research fellow. Besides ion chromatography modelling, his research interests lie in chemometrics, especially in quantitative structure-activity/property/retention relationship modelling (QSAR, QSPR, QSRR) and in the development of computer programs used for the modelling.

Dr Andras Gaspar

PhD, MSc

Pfizer Postdoctoral Research Fellow,
University of Tasmania

In 2005, Andras Gaspar obtained his master degree in bioengineering, specialising in analytical chemistry. In his master thesis, he combined extraction and separation techniques with different detection methods. After his master studies in Budapest, he received his PhD at the Technical University of Munich in Germany, where he specialised in electrophoretic separation, coupled mass spectrometry techniques, and explored molecular level interaction between pollutants and geochemical samples. He held a further postdoctoral position at the Max Planck Institute in Germany where he investigated the effects of pipeline fouling during upstream oil processes. He then joined ACROSS, where he was involved in researching the characterisation of vaccines.

Dr Rosanne Guijt

PhD, MSc, MRACI CChem

ARC Australian Postdoctoral Fellow,
Part-time Lecturer,
University of Tasmania

Rosanne Guijt obtained her MSc in biopharmaceutical sciences from Leiden University (the Netherlands), and her PhD from Delft University of Technology (the Netherlands), with a significant part of her PhD studies being conducted at the Institute de Microtechnique (Switzerland). Her research interests lie in the design and fabrication of microfluidic devices for application in chemistry and life sciences, especially in the development of simple and cost-effective microfabrication methods to make this research area more accessible. Applications of the microdevices include the characterisation of explosive residues, drug monitoring and organic synthesis.

KEY personnel

Professor Emily Hilder

PhD, BSc(Hons), FRACI CChem

Professor and ARC Future Fellow, University of Tasmania

Emily Hilder is a graduate of the University of Tasmania where she obtained the degrees of BSc(Hons) and PhD. She has held postdoctoral positions at Johannes Kepler University (Austria) and the E.O. Lawrence Berkeley National Laboratory (USA), and was an ARC Postdoctoral Fellow at ACROSS from 2004-2007. Her research interests lie in the general area of separation science, in particular the development and application of novel polymeric monolithic materials as selective adsorbents and chromatographic stationary phases. She is also interested in miniaturised analytical systems, particularly for applications in clinical diagnostics, counter-terrorism and environmental monitoring. She is an editor of the *Journal of Separation Science*.

Dr Joe Hutchinson

PhD, BSc(Hons), MPA

ARC Postdoctoral Research Fellow (Industry), University of Tasmania

Joe Hutchinson completed his undergraduate and postgraduate studies at the University of Tasmania and was involved in pre-concentrating small ions using various stationary phases in capillary electrophoresis. After completing his PhD, he relocated to the University of Waterloo (Canada), to assume a position as a Postdoctoral Research Fellow under the supervision of Professor Janusz Pawliszyn. During this time he developed automated solid-phase microextraction (SPME) systems on the 96-well plate format for GC and LC platforms. His research interests include developing fast, automated and portable separation systems for real-world samples including fingerprinting explosive devices to combat terrorism.

Dr Cameron Johns

PhD, BSc(Hons)

ACROSS Postdoctoral Research Fellow, University of Tasmania

Cameron Johns obtained the degrees of BSc(Hons) and PhD from the University of Tasmania. He was an Alexander von Humboldt Research Fellow at Philipps University (Marburg, Germany), during June 2004-November 2005, working in the area of ion-exchange capillary electrochromatography. His research interests also include indirect photometric detection in capillary electrophoresis and the application of ion chromatography to forensic samples.

Dr Tom Kazarian

PhD, MSc(Hons)

Pfizer Postdoctoral Research Fellow, University of Tasmania

Tom Kazarian graduated from the University of Tasmania receiving BSc(Hons) and PhD degrees. His doctorate work focused on the analysis of carbohydrates and their preconcentration using capillary electrophoresis and microfluidic platforms. After completing his PhD, he held postdoctoral positions at Dalian Institute of Chemical Physics in China, and Pfizer Analytical Research Centre, Hobart. He was also briefly involved with intellectual property law at Griffith Hack in Melbourne. His scientific research interests and expertise lie in the field of liquid chromatography, with a focus on the analysis of pharmaceutical formulations using a variety of detection platforms.

Professor Mirek Macka

PhD, RNDr, MRACI CChem, MRSC

New Stars Professor, University of Tasmania

Mirek Macka holds the degree of RNDr, equivalent to MSc and BSc in analytical chemistry from the Masaryk University (Brno, Czech Republic), and a PhD from the University of Tasmania. He started his career as a research scientist in the pharmaceutical industry in Europe, and with his move to Australia in 1994, switched to an academic career. His research interest are in the areas of analytical chemistry, separation science, liquid chromatography, capillary electrophoresis, electrochromatography, miniaturised and microfluidic chip-based analysis, instrumental design, solid-state light sources, and numerical modelling and simulations. He is a member of three editorial boards, including *Analytica Chimica Acta* and *Electrophoresis*.

Dr Dimitar Mitev

PhD, MSc

ACROSS Postdoctoral Research Fellow, University of Tasmania

Dimitar Mitev completed his MSc studies at the St. Clement of Ohrid University of Sofia (Bulgaria), and was awarded his PhD at the Space Research Institute, located at the Bulgarian Academy of Sciences. Here he worked on blasting technologies for synthesis and treatment of materials, and in particular detonation nanodiamond. In 2010, he moved to the Institute of Metal Science, Equipment and Technologies at the Bulgarian Academy of Sciences, where he continued his work on the application of blasting- and pyro-technologies for anti-terrorism and defence purposes. In 2011, he moved to the University of Tasmania as a postdoctoral fellow to develop novel methods of purification and continue with the characterisation of nanodiamond at ACROSS.

Dr Blagoj Mitrevski

PhD, BSc(Hons)

Postdoctoral Research Fellow, Monash University

Blagoj Mitrevski, a former forensic scientist for the Macedonian police, graduated from RMIT after completing his PhD in 2010. He commenced his postdoctoral research at Monash University, with the move of Professor Marriott's research group to Monash. His research at Monash involves the application of advanced GC and GC×GC methods to drugs analysis, pesticides analysis and bio-fuels analysis. Most of this is supported by selective GC detection and mass spectrometry.

Professor Pavel Nesterenko

DSc, PhD, MSc, MRACI CChem

Quantum Leaps Professor, University of Tasmania

Pavel Nesterenko obtained his degrees from the Lomonosov Moscow State University (Russia), focusing his MSc in petrochemistry and organic catalysis, and his PhD and DSc in analytical chemistry. He is currently a professor within ACROSS at the University of Tasmania. His research area is associated with the development, investigation and application of new adsorbents and chromatographic columns for different separation techniques, including high-performance liquid chromatography, ion chromatography, chiral phase chromatography and ligand-exchange. He is Editor-in-Chief of *Journal of Analytical Chemistry Research*, and a member of the editorial boards of *Analytica Chimica Acta*, *Encyclopedia of Analytical Chemistry*, *Open Journal of Analytical Chemistry* and *International Journal of Analytical Chemistry*.

Dr Anna Nordborg

PhD, MSc

Pfizer Postdoctoral Research Fellow, University of Tasmania

Anna Nordborg is a graduate of Umeå University, Sweden. She obtained her MSc in Chemistry with the thesis work performed at a pulp and paper research institute, STFI-Packforsk AB (Stockholm, Sweden), where she also worked as a research engineer after completion of her MSc. In 2008, she obtained her PhD from Umeå University on the synthesis and surface modification of materials for use in separation science. Part of her PhD studies was conducted at University of Berkeley and Lawrence Berkeley National Laboratory (California, USA). Her current research aims include the development of tools to aid in the characterisation of biopharmaceuticals. This includes the development and characterisation of stationary phases, mainly monoliths, for analytical applications.

Dr Anne Palmer

PhD, BSc, BAntSt(Hons)

Pfizer Postdoctoral Research Fellow, University of Tasmania

Anne Palmer holds the degrees of BSc, BAntSt(Hons) and PhD from the University of Tasmania. In 2008 she was a research fellow at ACROSS, within the University of Tasmania, and worked in close collaboration with the Australian Antarctic Division. Her research interests lie predominantly in the field of environmental chemistry and the application of separation science to enhance knowledge of trace metal speciation in natural waters.

Professor Brett Paull

PhD, BSc(Hons), FRSC, CChem

New Stars Professor, University of Tasmania

Brett is a University of Plymouth (England) BSc(Hons) and PhD graduate, and a Fellow of the Royal Society of Chemistry. He took up his first lectureship at the University of Tasmania from 1995 to 1997, before moving to Dublin City University (1998-2011), where he currently holds an Adjunct Professorial position. In 2011, Brett rejoined the University of Tasmania as Professor in the School of Chemistry. His research interests within ACROSS specifically focus upon the production and characterisation of new materials and platforms for application within the analytical and bio-analytical sciences, and in particular advanced inorganic and organic phase materials for selective extraction and separation purposes. Brett is currently Editor-in-Chief of the Royal Society of Chemistry journal, *Analytical Methods*.

Associate Professor Joselito Quirino

PhD, MSc, BSc

Associate Professor and ARC Future Fellow, University of Tasmania

Joselito Quirino holds a BSc in Industrial Pharmacy (1992) from the University of the Philippines and a MSc (1998) and PhD (1999) in Material Science from the Himeji Institute of Technology (HIT), Japan. He was a postdoctorate at HIT (1999-2000) and Stanford University (2000-2001), and has five years experience in the USA working as an analytical development scientist in the biotechnology and pharmaceutical industry. He is currently employed as Senior Lecturer under the Quantum Leaps Program of the University of Tasmania. His research interest are on the fundamentals and applications of on-line sample preconcentration in capillary zone electrophoresis, electrokinetic chromatography, and electrochromatography, as well as the applications of separation science to drug discovery and development.

KEY personnel

Associate Professor Robert Shellie

PhD, BAppSc(Hons), MRACI CChem

Associate Professor and ARC Australian Research Fellow, University of Tasmania

Robert Shellie obtained postgraduate training in ACROSS at RMIT University. Prior to his arrival in Tasmania in 2005, he held a post-doctoral position at the Max-Planck Institute of Molecular Plant Physiology in Golm, Germany. Robert's research is supported by the Australian Research Council and his research interests include multidimensional separations, high-speed chromatography, metabolomics, and modelling of chromatographic retention behaviour.

Dr Eadaoin Tyrrell

PhD, BSc(Hons)

ACROSS Postdoctoral Research Fellow, University of Tasmania

Eadaoin Tyrrell is a graduate of Dublin City University (Ireland), where she obtained her PhD in analytical chemistry. Prior to joining ACROSS in 2006, she spent a year as an Assistant Lecturer in Chemistry at Dublin City University. She is particularly interested in the area of separation science, where current work includes the development of an ion chromatography system for the pre-blast screening of inorganic improvised explosive devices. Other areas of interest include the design and fabrication of microfluidic-based devices for environmental monitoring.

Dr Philip Zakaria

PhD, BSc(Hons), MPA

ACROSS Postdoctoral Research Fellow, University of Tasmania

Philip Zakaria graduated from the University of Tasmania and completed his subsequent postgraduate training at ACROSS in 2003. Upon completion of his PhD he spent one and a half years as a Postdoctoral Fellow within ACROSS. Prior to returning as a Pfizer Postdoctoral Fellow in 2007, he worked in a commercial wine laboratory as well working outside of the chemistry field. His research interests include pharmaceutical separations using ion chromatography and the possibility of modelling the observed chromatographic retention behaviour. Other interests include development of more universal detection schemes for chromatographic pharmaceutical separations.

Dr Zhong-Da Zeng

PhD, BSc

Postdoctoral Research Fellow, Monash University

Zhong-Da Zeng is supported by an Australian Research Council Discovery Grant appointment, and brings to this group a wealth of experience in chemometrics. He trained with Professor Yi-Zeng Liang (editor of *Chemometrics and Intelligent Laboratory Systems*), at Central South University, China. His prior research appointment was as a postdoctoral researcher at the Hong Kong Polytechnic University. His key interests are in separation methods and mass spectrometry applications, with chemometric interpretation of complex datasets. He has developed many useful data handling packages and automated programs for research and industry.

TECHNICAL AND administrative staff

Miss Helen Barnard
Administrative Officer
University of Tasmania

Mr Anthony Malone
Computing Technical Officer
University of Tasmania

Ms Clodagh Moy
Technical Officer
University of Tasmania

Dr Kim Shepherd
Administrative Assistant
RMIT University

visitors TO ACROSS

Visitor	Country	Institution	Period of visit	Location
Dario Caldarola	Italy	University of Turin	6 months	UTAS
Izabel Cardeal	Brazil	University of Sao Paolo	6 months	Monash
David Collins	Ireland	Dublin City University	2 months	UTAS
Larisa Elena Florea	Ireland	Dublin City University	3 months	UTAS
Patrick Floris	Ireland	Dublin City University	3 months	UTAS
Frantisek Foret	Czech Republic	Institute of Analytical Chemistry of the ASCR, v.v.i.	2 weeks	UTAS
Georges Guiochon	USA	University of Tennessee	1 week	UWS
Xiaoyun (Lilly) He	Ireland	Dublin City University	3 months	UTAS
David Jensen	USA	Brigham Young University	2 weeks	UTAS
Phil Jones	England	University of Plymouth	1 month	UTAS
Jin Young Kim	Korea	Drug Analysis Lab, Supreme Prosecutor's Office	2 months	Monash
Radim Knob	Czech Republic	Palacký University in Olomouc	9 months	UTAS
Matthew Linford	USA	Brigham Young University	2 weeks	UTAS
Ruth Lloyd-Williams	England	King's College London	3 months	UTAS
Eduardo Mateus	Portugal	New University of Lisbon	6 months	Monash
Angel Medina-Oliva	Germany	University of Mainz	2 weeks	UWS, UTAS
Nicola McGillicuddy	Ireland	Dublin City University	3 months	UTAS
Pierre Guiglion	France	School of Chemistry of Montpellier	6 months	UWS
Ekaterina Nesterenko	Ireland	Dublin City University	2 months	UTAS
Alexandra Ribeiro	Portugal	New University of Lisbon	6 months	Monash
Marketa Ryvolova	Czech Republic	Mendel University in Brno	3 months	UTAS
Sara Sandron	Ireland	Dublin City University	3 months	UTAS
Hyun Sunhee	Korea	Chung-Ang University	2 weeks	Monash
Landon West	USA	Brigham Young University	2 weeks	UTAS

RESEARCH funding

UTAS NODE

Applicant(s)	Funding scheme	Type of grant	Title	Funding for 2011
Arrua RD	University of Tasmania	Conference Support Scheme	35th International Symposium on Capillary Chromatography, San Diego, USA	$1,882
Bowie AR	University of Tasmania	Rising Stars Round 3	Rising Stars	$17,000
Bowie AR, Lannuzel D, Townsend AT, Seen AJ	University of Tasmania	Cross Theme	Novel analytical technologies using high resolution inductively coupled plasma mass spectrometry for the rapid and accurate determination of biologically-important trace elements in seawater	$19,500
Breadmore MC	Australian Research Council	Discovery Project	Integrated microfluidic device for the direct analysis of drugs and metabolites in biological fluids	$130,000
Breadmore MC	Foundation for Research, Science and Technology	Consultancy	Fast fluidic microanalysis	$6,876
Breadmore MC	University of Tasmania	Conference Support Scheme	MicroTAS 2011: The 15th International Conference on Miniaturised Systems for Chemistry and Life Sciences, Seattle, USA	$3,292
Breadmore MC	University of Tasmania	Rising Stars Round 1	Rising Stars	$24,404
Breadmore MC, Haddad PR, Hilder EF, Dicinoski GW, Hutchinson J, Guijt RM, Nesterenko PN, Quirino JP, Johns CA	Department of the Prime Minister and Cabinet	National Security Science and Technology Unit Counter Terrorism	Portable multiplexed electrophoretic and chromatographic systems for the detection and identification of explosives	$657,202
Breadmore MC, Manfield M, Powell S	Department of Sustainability, Environment, Water, Population and Communities	Australian Antarctic Science	A new method for characterisation of Antarctic microbial communities	$25,150
Dicinoski GW	University of Tasmania	Conference Support Scheme	36th International Symposium on High Performance Liquid Phase Separations and Related Techniques (HPLC 2011), Budapest, Hungary	$2,500
Dicinoski GW, Breadmore MC	Department of the Prime Minister and Cabinet	Research Support for National Security	Development of a commercial-ready pre-blast explosive analyser for inorganic-based homemade explosive (HME) screening	$612,500
Guijt RM	University of Tasmania	Rising Stars Round 2	Rising Stars	$24,346
Guijt RM, Dickson TC, Breadmore MC	University of Tasmania	Cross Theme	A lab on a chip for stressing neurons	$19,956
Haddad PR	Australian Research Council	Discovery Projects	Simulation and optimisation of retention in ion chromatography with multi-step elution profiles	$170,000
Haddad PR	Australian Research Council	Federation Fellowship	Separation science based on nanoparticle-coated monolithic scaffold stationary phases	$316,222

Applicant(s)	Funding scheme	Type of grant	Title	Funding for 2011
Haddad PR, Dicinoski GW	Department of Economic Development, Tourism and the Arts	Tasmania Development and Resources	Support for four international PhD students assisting in PARC	$66,800
Haddad PR, Dicinoski GW, Hutchinson J, Szucs R	Australian Research Council	Linkage Projects Round 2	Non-discriminatory, universal and sensitive detection technologies for fluid based separation techniques in the pharmaceutical industry	$55,000
Haddad PR, Hilder EF, Shalliker RA	Australian Research Council	Discovery Project	Synthesis, characterisation and evaluation of novel ion-exchange polymer monolithic stationary phases for separation science	$135,000
Haddad PR, Nesterenko PN, Macka M, Paull B	Department of Innovation, Industry, Science, Research and Tertiary Education	Australian Academy of Science (International Research Staff Exchange Scheme) – Marie Curie Staff Exchange	MASK: Material and advanced sensor knowledge exchange	$22,500
Haddad PR, Palmer AS, Seen AJ, Riddle M	Department of Sustainability, Environment, Water, Population and Communities	Grant	Engagement of UTAS professional services to support the AAD human impacts research program	$45,000
Hassler CS, Doblin MA, Bowie AR, Mancuso Nichols CA, Butler EC, Slaveykova-Startcheva V	Australian Research Council	Discovery Projects	Novel technologies to resolve the role of organic matter on iron chemistry and bioavailability in the Southern Pacific Ocean	$90,000
Hilder EF	Australian Research Council	Future Fellowship	High performance chromatography based on nanostructured monolithic polymers	$171,600
Hilder EF	University of Tasmania	Research Enhancement (REGS)	Identifying nephrotoxins in the urine of Australian Aborigines	$35,000
Hilder EF	University of Tasmania	Rising Stars Round 1	Rising Stars	$24,674
Hilder EF, Shellie RA, Candish E	SGE Analytical Science	Scholarship-Top-Up	Elite scholarship support – Esme Candish	$7,500
Johns CA	University of Tasmania	Conference Support Scheme	10th International Symposium on Forensic Sciences, Bratislava, Slovak Republic	$1,927
Kamenetsky VS, Breadmore MC, Vickers JC, Jacobson GA, McGuinness DS	Australian Research Council	Grant-Linkage Infrastructure	Purchase of a new generation fast mapping Raman system	$240,000
Macka M	University of Tasmania	UTAS School of Chemistry Research Support	Research students support fund	$5,000
Nesterenko PN, Paull B	Australian Research Council	Discovery Projects	Micro-disperse sintered nano-diamonds: A new class of versatile absorbent for high performance liquid chromatography	$150,000

RESEARCH funding

UTAS NODE cont.

Applicant(s)	Funding scheme	Type of grant	Title	Funding for 2011
Patel RP, Hutchinson J, Johns CA, Jacobson GA, Narkowicz CK, Peterson GM	University of Tasmania	Cross Theme	Development of a simple and effective ion-chromatographic analysis for the separation and identification of non-anticoagulant fractions of enoxaparin	$6,950
Paull B	University of Tasmania	Conference Support Scheme	European Lab Automation – Advances in Separation Technology, Hamburg, Germany	$1,400
Quirino JP	Australian Research Council	Future Fellowship	Green sample preparation technologies for analytical chemistry	$175,823
Quirino JP	University of Tasmania	Conference Support Scheme	IUPAC International Conference on Analytical Science, Kyoto, Japan	$2,460
Shabala SN, Guijt RM	Australian Research Council	Discovery Project	Novel approach to study mechanisms of Na+ transport in plants using lab on a chip technology	$90,000
Shellie RA	Australian Research Council	Discovery Project	A field-portable comprehensive multidimensional gas chromatograph	$160,000
Shellie RA	University of Tasmania	Rising Stars Round 2	Rising Stars	$24,980
Wanandy ST, Patel RP, Randall C, Jacobson GA, Holmes SE, Hutchinson J, Johns CA	Royal Hobart Hospital Research Foundation	Research	Investigations of the chemical and physical stability of iron polymaltose intravenous infusion	$6,364

Total **$3,548,808**

ACROSS draws together multi-institutional, internationally prominent and genuinely collaborative research teams, having complementary skills and synergistic resource-base expertise, and committed to focused programs of national significance.

MONASH NODE

Applicant(s)	Funding scheme	Type of grant	Title	Funding for 2011
Marriott PJ	Agilent Technologies	Research Project Gift Application	Rapid instrumental methodologies for high-throughput high-quality separations technologies applied to bio-marker identifications	$80,386
Marriott PJ, Choi HK	Korean Science and Engineering Foundation	World Class Universities Program	Collaborative research on multidimensional and comprehensive GC	$100,000
Marriott PJ, Huegel H	Australian Research Council	Discovery	Simulation, modelling, prediction and two-dimensional retention database development in comprehensive two-dimensional gas chromatography (GC×GC)	$70,000
Marriott PJ	Australian Research Council	Discovery	Integrated multidimensional gas chromatography - spectroscopic detection methodology for chemical marker discovery	$100,000
Marriott PJ	Australian Academy of Science	Scientific Exchange	Linkage exchange grant to Portugal	$5,000
Marriott PJ	Agilent Technologies	Total Agilent Experience Technologies	Program of training and education for Agilent	$5,000

Total **$360,386**

UWS NODE

Applicant(s)	Funding scheme	Type of grant	Title	Funding for 2011
Shalliker RA	Thermo Electron Manufacturing	Research	Active flow management chromatography columns	$210,000
Ferrara M, Stephen G, Holt S	Australian Institute of Nuclear Science and Engineering	Honours Scholarships	Honours Scholarship	$5,000
Leo C, Dennis G, Collins A, Gwan P, Farmer A	CSIRO	Flagship Collaboration Research	Characterisation of high power sonicated and WHIMS Bayer red mud residues	$270,007
Castignolles P, Aldrich-Wright J, Jones M	University of Western Sydney	Research	Branched degradable polymers for anti-cancer drugs delivery	$11,379
Castignolles P	University of Western Sydney	Travel	Australasian Polymer Symposium	$1,500

Total **$497,886**

MONASH STORY 2011

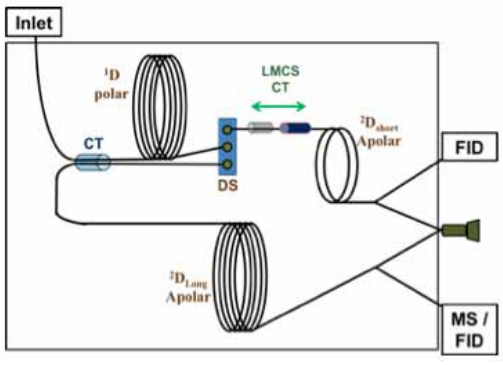
Aromas and Flavours: Advanced Olfactometry – Mass Spectrometry Methods for Profiling Odours

Aroma analysis is a complex and specialised subject. It is also an important and developing field. Applications which depend upon some knowledge of the odour of a compound or sample include the obvious 'nice' areas of perfumery, essential oils, foods (wine, herbs/spices, coffee), fruits, and clearly objectionable areas of taints (e.g. water odours), body odour, breath, garlic, rancid meats, and some fruit such as the infamous durian. Perhaps the most outstanding performance in the area of odour detection is the ability of tracker dogs to locate missing persons, to be trained to detect pollutants e.g. PCBs, or search for survivors during earthquakes. In 2004, the Nobel Prize for Physiology or Medicine was awarded to Axel and Buck for their work on sensory receptors "*for their discoveries of odorant receptors and the organisation of the olfactory system*", giving recognition to the important area of odour detection.

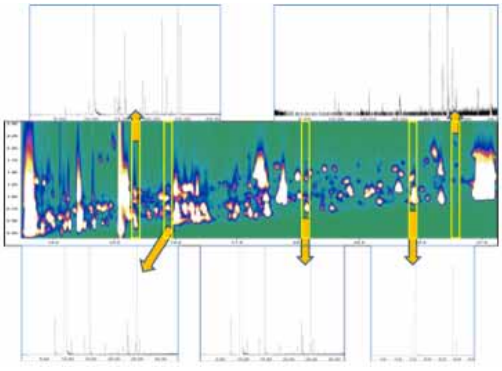
Within ACROSS (Monash) we have focused on volatile compounds and aromas from samples such as fruits (strawberry), herbs and spices, wine, coffee, perfumes, hops, coriander, and even cooked celery, and pepper. However, not all of these have been included in our olfactory assessment of specific aroma compounds. At present, this work largely focuses on wine, coffee, and herbs (e.g. fennel). Olfactory research requires a trained panel to be set-up, and most importantly trained to recognise specific odours and their intensity. A properly trained panellist plays an important support role in this research. This is done by using a training set of odours, so that standard odours with different descriptors can be identified and most importantly, can be written down by the panellist in a meaningful and scientific manner.

Not surprisingly, our studies are based on gas chromatography and mass spectrometry. Olfactometric detection implies use of the sensory organ (nose) for sensing compounds eluted from a GC column. Our research is differentiated by our focus on innovative methods that provide best possible compound separation. We also use various detectors in this research – FPD-S mode, FID, MS and the nose (shown below). By employing a combination of 1D GC, multidimensional GC (MDGC), and comprehensive two-dimensional GC (GC×GC), with various detectors, we are able to provide an overall picture of the chemical composition of the sample, identify these by using mass spectrometry combined with library searching and retention indices or authentic standards, and then profile the character impact odorants.

System Design



GCxGC/MDGC/O results for wine



UWS STORY 2011

New Column Technology Driving Efficiency in the Laboratory

Discussion on separation efficiency often infers that the key concept is the number of theoretical plates presented by the chromatography column. Almost all chromatographers at some point in time have referred to the measurement of plates as the measurement of separation 'efficiency', many still do so. However, the number of theoretical plates is not a true reflection of the efficiency of a separation, other factors need to be considered. For example, the analysis speed and sensitivity in detection are two other aspects that may be important, depending on the requirements and the demands placed on the laboratory undertaking the assay. In the modern laboratory mass-spectral detection plays an important role, but the union between LC and MS is far from perfect and there are many trade-offs that need to be factored into an analysis using both LC and MS. Both LC and MS provide a degree of correlation in their purpose; they both provide separations, yet they do so from effectively an orthogonal stand point. LC provides a physical separation, MS an information separation and when efficiency in a separation is measured, trade-offs in how both of these techniques function need to be factored into the overall assay design.

An important component of the studies currently being undertaken at UWS is focused on improving separation efficiency. Part of the solution has been to redesign the HPLC column. Studies have shown that band profiles that migrate through a column do so in a bowl shaped plug. Many more theoretical plates are required to separate bowls in their entirety than are required to separate just the surfaces of these bowls. That is why localised end-column and on-column detection methods enable columns to present much greater numbers of theoretical plates. These detectors do not see the band in its entirety, only instead, the solute that passes directly through or across it.

Within ACROSS (UWS), we have developed a new type of chromatography column that emulates the end-column approach to detection, but does so in a manner that can be automated in any current existing HPLC system. Effectively these new columns split the flow stream prior to exit from the column. The flow along the radial central section of the bed is separated from flow along the radial wall section. Each of these flow streams are processed separately, the benefit being that the flat central section of the bowl is detected separately from the more axially dispersed wall section of the bowl. In essence a 'virtual' column is established. Band broadening is decreased in these virtual columns as they have no wall effect, and their radial heterogeneity is small across the virtual column diameter, effectively yielding more theoretical plates at detection. Detection sensitivity in light attenuating and mass spectral detectors is also increased.

A further important benefit of these columns is that only a portion of the solute is extracted from the entire sample distribution, the volume of the peak presented to the detector is thus decreased. These types of columns therefore interface better with volume limited detectors, most significantly, the mass spectrometer. Even though the volume of a solute band upon exit from the column is greatly reduced, these columns are far more dead volume tolerant than comparable narrow bore columns that are currently employed in LCMS applications. This stems from the fact that at the column inlet, the column volume has an analytical scale format, while only at the outlet does it carry the burden of a mini or micro-bore format.

RESEARCH students

Name	Degree	Commenced	Thesis Title	Supervisors
Aemi Syazwani Abdul Keyon	PhD	2011	Portable analytical technology for on-site determination of phytotoxins and pollutants in water	MC Breadmore, RM Guijt, C Bolch
Michelle Camenzuli	PhD	2010	Advances in HPLC volume technology	RA Shalliker, GR Dennis
Esme Candish	PhD	2011	Novel polymeric monolithic devices to aid sample preparation in bioanalysis	EF Hilder, RA Shellie, A Gooley
Tim Causon	PhD	2009	High temperature liquid chromatography using organic polymer monoliths	EF Hilder, RA Shellie
Sung Tong Chin	PhD	2009	Multidimensional GC and MS approaches for odourants in wine and related products	PJ Marriott, G Eyres
Jeremy Deverell*	PhD	2006	Microreactors for organic synthesis	RM Guijt, AJ Canty, T Rodemann
Kagan Dokumcu*	Honours	2011	Characterisation of enzymatically degraded chitosan	A Lauto, P Castignolles, M Gaborieau
Emer Duffy	PhD	2011	Development of centrifugal micro-fluidic disc (u-CD) platforms for automated analytical chemistry	B Paull, PN Nesterenko
Michael Dunn	PhD	2005	Targeted multidimensional GC methods of analysis	PJ Marriott, RA Shellie
Grace Gao	PhD	2009	Serum pharmacochemistry and pharmacokinetic studies of zuojin pill	PJ Marriott, XW Yang
Jessica Gathercole	PhD	2007	Development of a pre-clinical diagnostic test for devil facial tumour disease	MC Breadmore, EF Hilder, RA Shellie
Adam Gaudry	PhD	2010	Detection and identification of homemade inorganic and organic improvised explosive devices	MC Breadmore, RM Guijt
Daniel Gstöettenmayr	PhD	2011	Development of a novel ultrasensitive capillary electrophoresis-mass spectrometry system for the analysis of environmental pollutants	MC Breadmore, JP Quirino
Paul Harvey	PhD	2006	Development and application of multidimensional gas chromatography for quantitative monitoring of Antarctic and sub-Antarctic fuel spills	PR Haddad, RA Shellie, I Snape
Rowan Henderson*	PhD	2007	Revolutionising lab-on-a-chip using polymer electrodes	RM Guijt, MC Breadmore, EF Hilder, PR Haddad, TW Lewis
William Henderson	Honours	2011	Analysis of glass frictionators in 0.22 calibre ammunition	GW Dicinoski, AT Townsend
Shaghayegh Hossein	MSc	2011	Metallohelicates and their biological activity	J Aldrich-Wright, P Castignolles, M Gaborieau
Wei Boon (Jason) Hon*	PhD	2007	Miniaturisation of the bioanalytical process	EF Hilder, PR Haddad
Lucy Weihui Huang	PhD	2009	The chemical analysis and anti-oxidant activity of volatile compounds of Australian native plants	PJ Marriott, H Hügel
Hwaida Issa*	Masters by coursework	2010	Capillary electrophoresis and size exclusion chromatography of chitosan	P Castignolles, M Gaborieau
Kara Johns	PhD	2006	Consideration of capillary electrophoresis as an analysis technique for the therapeutic drug monitoring of antipsychotics	MC Breadmore, PR Haddad, R Bruno
Naama Karu	PhD	2008	High performance ion-exchange chromatography for separation of organic ions	PR Haddad, GW Dicinoski
Nicha Kawila	PhD	2008	GC×GC analysis of the formation of the toxin acrylamide during processing of cereal grain foods	D Small, PJ Marriott
Manish Khandagale	PhD	2010	Non-discriminatory, universal and sensitive detection technologies for fluid based separation techniques in the pharmaceutical industry	GW Dicinoski, J Hutchinson, PR Haddad
Sunny Lee Sun Kim	PhD	2011	Development of absolute molecular configuration strategies based on multidimensional separation with spectroscopic methodologies	PJ Marriott, K Tuck
Danijela Kokic	PhD	2010	Ultra-high resolution separations of complex samples derived from biological matrices	RA Shalliker, GR Dennis

Name	Degree	Commenced	Thesis Title	Supervisors
Jim Luong	PhD	2011	Gas chromatographic applications and method developments with planar microfluidic devices	RA Shellie, HJ Cortes
Bussayarat Maikhunthod	PhD	2008	Herb and spice profiling by using GC×GC and MDGC methods	PJ Marriott, D Small
Lea Mauko*	PhD	2008	Glycosylation analysis of therapeutic monoclonal antibodies	EF Hilder, PR Haddad
Russell McGifford*	PhD	2006	Spatial and selective colorimetric detection of polluting metal ions using the diffusive gradients in thin-films (DGT) technique	AJ Seen, PR Haddad, AS Palmer
Yi Heng (Ryan) Nai	PhD	2009	A new approach for characterisation of microbial communities	MC Breadmore, S Powell, M Manefield
Boon Khing Ng*	PhD	2007	Ion chromatography in silico	GW Dicinoski, RA Shellie, PR Haddad
Mitra Nouri Koupaei	MSc	2010	Towards a better understanding of uraemic molecules	EF Hilder, RA Shellie, M Jose
James Oliver	PhD	2010	Novel substrates for bioethanol production	M Philipps, J Markham, P Peiris, P Castignolles
William Percey	PhD	2009	Sodium transport and compartmentation in cereal crops under saline conditions	S Shabala, RM Guijt, MC Breadmore, J Bose
Anton Peristyy	PhD	2011	Preparation and characterisation of diamond based stationary phases for ultra high performance liquid chromatography	PN Nesterenko, B Paull
Oscar Potter*	PhD	2006	New materials and techniques for integrated microscale bioanalytical devices	EF Hilder, MC Breadmore
Samuel Poynter	PhD	2007	Optimisation and application of pneumatic modulation techniques for comprehensive two-dimensional gas chromatography	PR Haddad, RA Shellie
Sercan Pravadali	PhD	2010	Analysis of complex samples using multidimensional separations and selective detection	RA Shalliker, GR Dennis, X Conlan
Tomas Remenyi	PhD	2008	Quantifying dust deposition into the Southern Ocean using dissolved aluminium concentrations as a tracer	AR Bowie, PR Haddad, PN Nesterenko, ECV Butler
Kavitha Samykanno	PhD	2008	Aroma profiling of strawberries using gas chromatography-olfactometry and comprehensive two-dimensional gas chromatography	E Pang, PJ Marriott
Benjamin Savareear	PhD	2010	Characterisation of plant extracts using high resolution gas chromatography	RA Shellie, EF Hilder
David Schaller	PhD	2005	Design and synthesis of monolithic and nanostructured stationary phases for chromatography	EF Hilder, PR Haddad, CJ Evenhuis
Aliaa Shallan	PhD	2011	Microchip methods for the separation of drugs and metabolites in biological and environmental samples	MC Breadmore, RM Guijt
David Shock	PhD	2008 (P/T)	Selectivity in separations	RA Shalliker, GR Dennis
Marie Sinoir	PhD	2009	Zinc as a co-limiting micronutrient: Its distribution and modelling regarding climate change (change in pCO2) in the Tasman Sea	AR Bowie, PN Nesterenko, ECV Butler, M Mongin, C Hassler
Arianne Soliven	PhD	2008	In-situ modification of monolithic columns towards improved selectivity and faster separations	RA Shalliker, GR Dennis, EF Hilder, G Guiochon
Mohammad Talebi	PhD	2009	High performance ion-exchange stationary phases for biomolecules	EF Hilder, PR Haddad
Boon Kim Tan	PhD	2008	Profiling of the danshen herb by using LC/MS, LC-NMR and GC×GC/MS methods	E Pang, PJ Marriott, CG Li, S Urban
Mark Thomas	PhD	2011	Synthesis of polymer nanoparticles by RAFT in miniemulsion	EF Hilder, R Jones
Mark Trudgett	PhD	2010	Advanced aspects of multidimensional HPLC	RA Shalliker, G Guiochon
Grace Zeying Wu	PhD	2009	Comprehensive two-dimensional liquid chromatography of surfactants	PJ Marriott
Yiing Chiing Yap	PhD	2011	The microfluidic device: A novel in-vitro model of traumatic brain injury	T Dickson, MC Breadmore, A King, RM Guijt.

Students who completed their project during 2011 are marked with an asterisk.

COLLABORATIONS & industry links

Collaborator	Institution/company
Mr M Klee, Mr R Minett, Mr C Myerholtz	Agilent Technologies, USA
Dr D Lannuzel, Dr K Meiners, Dr M Mongin	Antarctic Climate and Ecosystems Cooperative Research Centre, Australia
G Hince, Dr M Riddle, Dr I Snape	Australian Antarctic Division, Tasmania
Mr C Frost, Mr B Jones	Australian Customs Service
Dr P Kirkbride	Australian Federal Police
Prof J Cooper-White	Australian Institute for Bioengineering and Nanotechnology, University of Queensland
Dr M Ellwood	Australian National University, Canberra
A/Prof A Horna	Bata University, Czech Republic
Dr P Sedwick	Bermuda Institute of Ocean Sciences, Bermuda
Dr T Rodemann, Dr A Townsend	Central Science Laboratories, University of Tasmania
Prof S Blain	Centre d'Océanologie de Marseille, France
Prof RG Gilbert	Centre for Nutrition and Food Science, University of Queensland
Prof G Gas, Dr L Krcmova, Prof P Solich	Charles University, Czech Republic
Dr D de Tata	Chemistry Centre, Western Australia
Prof HK Choi	Chung-Ang University, Korea
Dr T McDaniel	Combating Terrorism Technical Support Office, Technical Support Working Group, Virginia, USA
Prof G Meira	CONICET and Universidad Nacional del Litoral, Argentina
Prof JT Brenna	Cornell University, New York, USA
Dr ECV Butler, Dr C Hassler, Dr C Mancuso-Nichols, Dr S Rintoul, A/Prof T Trull	CSIRO Marine & Atmospheric Research
Prof BC Lin, Prof GW Xu	Dalian Institute for Chemistry Physics, China
Dr J Adcock, Prof N Barnett, Dr X Conlan, Dr P Francis	Deakin University, Victoria
Dr D Evans, Mr P Rawson	Defence Science and Technology Organisation, Canberra
Dr S Pyecroft	Department of Primary Industries and Water
Dr HG Schmarr	Dienstleistungszentrum Ländlicher Raum – Rheinpfalz, Germany
Dr N Avdalovic, Dr C Cowie, Dr K Flook, Dr P Jackson, Dr Y Liu, Mr D Moore, Mr CA Pohl, Dr J Schibler, Dr K Srinivasan	Dionex Corporation, California, USA
Dr D Brougham, Dr D Connolly, Dr D Diamond, Dr B Kelleher, Dr E Nesterenko	Dublin City University, Ireland
Mr B Schlensky	eDAQ, Sydney
Dr M Boyce	Edith Cowan University, Western Australia
Dr H Bizzo	Empresa Brasileira de Pesquisa Agropecuária, Brazil
Dr M Manefield	Environmental Biotechnology Cooperative Research Centre, University of New South Wales
Prof C Zini	Federal University of Rio Grande do Sul, Brazil
Dr W Landing	Florida State University, USA
Dr S Bieri	Food Authority, Geneva, Switzerland
Dr M Cook, Dr P Pigou	Forensic Science Services, South Australia

Collaborator	Institution/company
Prof G Desmet, Dr S Eeltink	Free University of Brussels, Belgium
Dr E Grosjean, Dr G Logan	Geoscience Australia, Canberra
Mr J Harcourt, Ms G de Plater, Mr M Smith	Grey Innovation, Victoria
Mr T Beaufort	Grinders P/L, Melbourne
Dr F Foret, Dr P Kuban	Institute of Analytical Chemistry, Academy of Sciences, Czech Republic
Dr A Nikitin	Institute of Lasers, Shatura, Russia
Prof M Schmidt	Johannes Gutenberg University, Germany
Prof C Barner-Kowollik, Dr T Junkers	Karlsruhe Institute of Technology, Germany
Prof T Fornstedt	Karlstad University, Sweden
Dr Y Sohrin	Kyoto University, Japan
Prof M Tanaka	Kyoto University of Technology, Japan
Dr T Wagener	Laboratoire d'Océanographie de Villefranche, France
Dr A Tagliabue	Laboratoire des Sciences du Climat et de l'Environnement, France
Dr N Nuchtavorn, Prof L Suntornsuk, Prof P Wilairat	Mahidol University, Thailand
Prof J Havel, Prof V Kanicky, Prof P Klan, A/Prof J Klanova	Masaryk University, Czech Republic
Prof R Kizek, Dr M Ryvolova	Mendel University, Czech Republic
A/Prof G Woods	Menzies Research Institute, University of Tasmania
Prof G Maliaras	Microelectronics Centre of Provence, École des Minés de Saint-Étienne, France
Prof F Svec	Molecular Foundry, Lawrence Berkeley National Laboratory, USA
Prof S Lanin	Moscow State University
Dr M Gaborieau, Prof J Aldrich-Wright	NANO Group, University of Western Sydney
Dr Francois Ganachaud	National Institute for Applied Sciences, France
Dr A Ross	National Institute for Forensic Science, Victoria
Dr P Boyd	National Institute of Water and Atmospheric research, New Zealand
Ms V Goodall, Ms A Lam	National Science, Security and Technology Unit of Prime Minister and Cabinet
Prof M Gomes da Silva, Dr E Mateus, Prof A Ribeiro	New University of Lisbon, Portugal
Mr M Pedler	Office of Transport Security, Canberra
Dr R Bemish, Mr O Drap, Dr W Farrell, Dr P Ferguson, Dr E Groeber, Dr M Hanna-Brown, Dr N Lacher, Dr R Robins, Mr K Saunders, Dr R Szucs, Dr J Wang, Dr B Zhang	Pfizer
Dr J Cochran, Dr F Dorman, Ms C Vargo	Restek Corporation, USA
A/Prof H Hügel, Dr CG Li Dr E Pang,	RMIT University, Melbourne
A/Prof S Shabala	School of Agricultural Science, University of Tasmania
Prof AJ Canty, Dr TW Lewis, Dr AJ Seen, Dr JA Smith	School of Chemistry, University of Tasmania
Dr GA Jacobson, Dr C Narkowicz	School of Pharmacy, University of Tasmania
A/Prof A Koutoulis, Dr S Whittock,	School of Plant Science, University of Tasmania
Dr M Jones	School of Zoology, University of Tasmania

COLLABORATIONS & industry links

Collaborator	Institution/company
Dr P Dawes, Dr A Gooley	SGE Analytical Science, Victoria
A/Prof S Battaglene, Dr Q Fitzgibbon	Tasmanian Aquaculture and Fisheries Institute, University of Tasmania
Insp J Cooper	Tasmanian Police
Dr H Ritchie	ThermoScientific, England
Prof JM Lin	Tsinghua University, China
Dr R Fieldhouse	UniQuest, Queensland
Dr G Frysinger	United States Coast Guard Academy, Connecticut
Prof Z Cardeal	Universidade Federal de Minas Gerais, Brazil
Dr V Schoemann	Université Libre de Bruxelles, Belgium
Prof J Glennon	University College Cork, Ireland
Dr J Dias, Prof L Kubota	University of Campinas, Brazil
Mr GA Blanco-Heras, Prof P Lopez-Mahia	University of A Coruña, Spain
Dr J Harynuk	University of Alberta, Canada
Prof P Hauser	University of Basel, Switzerland
Prof W Thormann	University of Bern, Switzerland
Prof D Chen	University of British Columbia, Canada
Dr A Goldstein	University of California, USA
Prof C Lennard	University of Canberra, Australia
Dr C von Meuhlen	University of Feevale, Brazil
Prof S Haswell	University of Hull, England
Prof P Dugo, Prof G Dugo, Prof L Mondello, Dr P Tranchida	University of Messina, Italy
Dr S Nowak, Prof U Karst	University of Münster, Germany
Prof M Destarac	University Paul Sabatier, France
Prof A Felinger	University of Pécs, Hungry
Dr M Lohan, Dr P Jones, Prof P Worsfold, Dr S Ussher	University of Plymouth, England
Prof D Bertin, Dr D Gigmes, Dr Y Guillaneuf, Dr C Lefay	Aix-Marseilles University, France
Prof J Corredor	University of Puerto Rico, Puerto Rico
Dr I Kempson	University of South Australia
Prof P Doble	University of Technology, Sydney
Dr F Gritti, Prof G Guiochon	University of Tennessee, USA
Prof B Mizaikoff	University of Ulm, Germany
Prof O Schmitz	University of Wuppertal, Germany
Mr R Hayes, Mr J Kelleher, Mr J Pearson,	Victorian Police
Dr F Dehairs	Vrije Universiteit Brussel, Belgium
Prof CF Ivory	Washington State University, USA
Dr S Smith	Waters Corporation, England
Dr P Lam	Woods Hole Oceanographic Institute, USA

publications

Books and book chapters

PJ Marriott. *Chapter 7: Detector technologies and applications in comprehensive two-dimensional gas chromatography*. Comprehensive Chromatography in Combination with Mass Spectrometry. Wiley-Interscience Series in Mass Spectrometry. Ed. Mondello L. 2011. 243-280.

RA Shalliker. Hyphenated and Alternative Methods of Detection in Chromatography. CRC Press. 2011.

SM Song, PJ Marriott. *Chapter 2: Analytical aspects of modern gas chromatography-mass spectrometry*. Hyphenated and Alternative Methods of Detection in Chromatography. CRC Press. Ed. Shalliker RA. 2011. 31-60.

Refereed journal articles

H Alwael, D Connolly, P Clarke, R Thompson, B Twamley, B O'Connor, B Paull. Pipette-tip selective extraction of glycoproteins with lectin modified gold nano-particles on a polymer monolithic phase. *Analyst*. 136 (2011) 2619-2628.

AT Aranas, AM Guidote Jr, PR Haddad, JP Quirino. Sweeping-micellar electrokinetic chromatography for the simultaneous analysis of tricyclics antidepressant and β-blocker drugs in wastewater. *Talanta*. 85 (2011) 86-90.

W Baeyens, AR Bowie, K Buesseler, M Elskens, Y Gao, C Lamborg, M Leermakers, TA Remenyi, H Zhang. Size-fractionated labile trace elements in the Northwest Pacific and Southern Oceans. *Mar. Chem*. 126 (2011) 108-113.

GA Blanco-Heras, YH Nai, EF Hilder, RA Shellie, GW Dicinoski, PR Haddad, MC Breadmore. Identification of inorganic improvised explosive devices using sequential injection capillary electrophoresis and contactless conductivity detection. *Anal. Chem*. 83 (2011) 9068-9075.

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AR Bowie, TW Trull, F Dehairs. Estimating the sensitivity of the subantarctic zone to environmental change: The SAZ-Sense project. *Deep Sea Res. Part II*. 58 (2011) 2051-2058.

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SO Yang, Y Kim, HS Kim, SH Hyun, SH Kim, HK Choi, PJ Marriott. Rapid sequential separation of essential oil compounds using continuous heart-cut multi-dimensional gas chromatography-mass spectrometry. *J. Chromatogr. A*. 1218 (2011) 2626-2634.

P Zakaria, C Bloomfield, RA Shellie, PR Haddad, GW Dicinoski. Determination of bromate in sea water using multi-dimensional matrix-elimination ion chromatography. *J. Chromatogr. A*. 1218 (2011) 9080-9085.

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H Zhong, Q Yao, MC Breadmore, Y Li, Y Lu. Analysis of flavonoids by capillary zone electrophoresis with electrokinetic supercharging. *Analyst*. 136 (2011) 4486-4491.

Other publications

Plenary, keynote and invited conference presentations

MC Breadmore. Capillary and microchip electrophoresis: Challenging the common conceptions. Invited keynote lecture presented at *11th Asia-Pacific International Symposium on Microscale Separations and Analysis (APCE 2011)*, Hobart, Australia, 27-30 November 2011.

MC Breadmore. Simple and effective on-line concentration strategies for biological samples. Invited keynote lecture presented at *18th International Symposium on Electro- and Liquid Phase-Separation Techniques (ITP 2011)*, Tblisi, Georgia, 28-31 August 2011.

MC Breadmore, RM Guijt, RD Henderson, LK Andrewartha, E Candish. Low cost microfluidics. Presented at *2nd Australian & New Zealand Micro and Nanofluidics Symposium (ANZ MNS 2011)*, Sydney, Australia, 28-29 April 2011.

M Camenzuli, H Ritchie, J LaDine, RA Shalliker. Understanding column bed heterogeneity in the quest for improved separation efficiency. Invited oral presentation at *American Institute of Chemical Engineers Conference 2011*, Minnesota, USA, 16-21 October 2011.

P Castignolles, RS Roi, B Ahling, T Kiefer, C Skworzow, S Fluegel, A Lauto, M Gaborieau, M Schmidt. Critical conditions capillary electrophoresis for characterisation of branched polymers and copolymers. Invited keynote lecture at *International Symposium on Separation and Characterisation of Synthetic and Natural Macromolecules (SCM 5)*, Amsterdam, Netherlands, 26-28 January 2011.

GW Dicinoski, G Blanco-Heras, MC Breadmore, E Tyrrell, R Guijt, YH Nai, EF Hilder, RA Shellie, JP Hutchinson, CA Johns, PR Haddad. Sub-minute screening of improvised explosives by electrophoresis. Invited keynote lecture presented at *23rd International Ion Chromatography Symposium (IICS 2011)*, Rhode Island, USA, 16-19 October 2011.

GW Dicinoski, PR Haddad, EF Hilder, MC Breadmore, RA Shellie, RM Guijt, JP Hutchinson, CA Johns, E Tyrrell, G Blanco-Heras. The development of multiplexed and rapid instrumentation for the detection and identification of the chemical composition of improvised explosives. Invited plenary presented at *International HME Workshop*, Washington DC, USA, February 2011.

GW Dicinoski, PR Haddad, CA Johns, E Tyrrell, KL Angoy. Development of novel chromatographic systems for the identification of homemade inorganic explosives. Invited lecture presented at *Pittsburgh Conference on Analytical Chemistry (Pittcon 2011)*, Atlanta, USA, 13-18 March 2011.

GW Dicinoski, JP Hutchinson, CA Johns, E Tyrrell, MC Breadmore, EF Hilder, RA Shellie, RM Guijt, PN Nesterenko, G Blanco-Heras, PR Haddad. Novel field-deployable systems to prevent acts of terrorism. Presented at *Parari 2011: 10th Australian Explosive Ordinance Symposium*, Brisbane, Australia, 8-10 November 2011.

GW Dicinoski, JP Hutchinson, CA Johns, E Tyrrell, EF Hilder, MC Breadmore, RA Shellie, RM Guijt, PN Nesterenko, KL Angoy, G Blanco-Heras, PR Haddad. Novel chromatographic systems to prevent acts of terrorism. Presented at *36th International Symposium on High Performance Liquid Phase Separations and Related Technologies (HPLC 2011)*, Budapest, Hungary, 19-23 June 2011.

PR Haddad. Capillary-based separations of inorganic ions. Golay Award plenary lecture presented at *35th International Symposium on Capillary Chromatography*, San Diego, USA, 1-5 May 2011.

PR Haddad. Smarter, faster, smaller, more powerful: New developments in ion chromatography. Invited lecture presented at *16th Desty Memorial Symposium*, London, England, 5 October 2011.

PR Haddad, GW Dicinoski, N Karu, V Drgan, BK Ng, P Zakaria, RA Shellie. Extending the scope of ion chromatography. Plenary lecture presented at *37th International Symposium on High Performance Liquid Phase Separations and Related Techniques (HPLC 2011)*, Dalian, China, 8-11 October 2011.

PR Haddad, GW Dicinoski, RA Shellie, BK Ng, EF Hilder, PN Nesterenko, P Zakaria, V Drgan. Recent advances in ion chromatography. Keynote lecture presented at *36th International Symposium on High Performance Liquid Phase Separations and Related Techniques (HPLC 2011)*, Budapest, Hungary, 19-23 June 2011.

PR Haddad, GW Dicinoski, RA Shellie, BK Ng, P Zakaria, V Drgan, R Szucs, M Hanna-Brown. Computer-assisted method development in ion chromatography. Presented at *Separation Science Asia 2011*, Biopolis, Singapore, 27-28 July 2011.

PR Haddad, EF Hilder, D Schaller, C Pohl, WB Hon, K Saunders. Ion-exchange stationary phases based on polymeric monoliths. Invited lecture at *Pittsburgh Conference on Analytical Chemistry (Pittcon 2011)*, Atlanta, USA, 13-17 March 2011.

RD Henderson, RM Guijt, OS Hutter, AD Henderson, PR Haddad, EF Hilder, TW Lewis, MC Breadmore. Polyaniline circuits for microfluidics. Presented at *5th Biennial Australian Colloid and Interface Symposium (ACIS 2011)*, Hobart, Australia, 30 January - 3 February 2011.

EF Hilder, D Arrua, A Nordborg, PR Haddad, R Jones. Novel monolithic cryopolymers incorporating functional nanoparticles. Presented at *14th Beijing Conference and Exhibition on Instrumental Analysis*, Beijing, China, 13-16 October 2011.

EF Hilder, D Arrua, A Nordborg, PR Haddad, R Jones. Novel monolithic cryopolymers incorporating functional nanoparticles. Presented at *37th International Symposium on High Performance Liquid Phase Separations and Related Techniques (HPLC 2011)*, Dalian, China, 8-11 October 2011.

EF Hilder, D Arrua, A Nordborg, PR Haddad, R Jones. Novel monolithic polymers for efficient capillary chromatography of biomolecules. Presented at *36th International Symposium on High Performance Liquid Phase Separations and Related Techniques (HPLC 2011)*, Budapest, Hungary, 19-23 June 2011.

EF Hilder, L Mauko, A Nordborg, NA Lacher, PR Haddad. Glycan profiling of monoclonal antibodies using zwitterionic-type hydrophilic interaction chromatography coupled with electrospray ionization mass spectrometry detection. Presented at *23rd Australian and New Zealand Society for Mass Spectrometry Conference (ANZSMS23)*, Fremantle, Australia, 29 January - 3 February 2011.

EF Hilder, L Mauko, M Talebi, A Nordborg, PR Haddad, NA Lacher, Q Wang. New methods for high resolution charge heterogeneity and glycan profiling of monoclonal antibodies. Presented at 35th *International Symposium on Capillary Chromatography*, San Diego, USA, 1-5 May 2011.

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JP Hutchinson, CA Johns, EC Tyrrell, MC Breadmore, EF Hilder, RM Guijt, PN Nesterenko, GW Dicinoski, PR Haddad. The challenges involved with separating and detecting TATP in the liquid phase. Presented at *10th International Forensic Science Symposium (IFSS 2011)*, Bratislava, Slovak Republic, 27-30 September 2011.

CA Johns, JP Hutchinson, MC Breadmore, EF Hilder, RM Guijt, PN Nesterenko, PR Haddad, GW Dicinoski. Development of capillary electrophoretic methods and instrumentation for the analysis of explosives. Presented at *10th International Forensic Sciences Symposium (IFSS 2011)*, Bratislava, Slovak Republic, 27-30 September 2011.

PJ Marriott. Green analytical chemical information, advanced methods for chemical characterisation. Presented at *3rd Asia-Oceania Conference on Green and Sustainable Chemistry*, Melbourne, Australia, 4-7 December 2011.

PJ Marriott. Strategies for identification of potent odorants in wine, coffee and spices using comprehensive two-dimensional gas chromatography approaches. Presented at *Joint Congress: 35th International Symposium on Capillary Chromatography, 26th International Symposium on MicroScale Bioseparations, 8th GC×GC Symposium (ISCC, MSB and GC×GC)*, San Diego, USA, 1-5 May 2011.

PJ Marriott, ST Chin, GT Eyres. Exploring comprehensive two-dimensional gas chromatography approaches for identification of potent odorants in wine. Invited keynote lecture presented at *9th International Symposium of Oenology (OENO 2011)*, University of Bordeaux, France, 15-17 June 2011.

PJ Marriott, ST Chin, B Maikhunthod. Developments in multi- and comprehensive 2D gas chromatography. Approaches for sensitive analysis of essential oil components. Presented at *4th Symposium on Aromas and Perfume*, University of Nice Sophia Antipolis, France, 1 July 2011.

PJ Marriott, ST Chin, M Maikhunthod. Making the most of minute amounts of material: Concentration effects in gas chromatography. Presented at *11th Asia-Pacific International Symposium on Microscale Separations and Analysis (APCE 2011)*, Hobart, Australia, 27-30 November 2011.

PJ Marriott, SJ Chin, B Maikhunthod, GT Eyres. Developments in gas chromatographic methodologies applied to flavour and essential oils analysis. Presented at *Food Science Conference*, Brisbane, Australia, February 2011.

PJ Marriott, G Wu. Comprehensive 2D liquid chromatography (LC×LC) analysis of nonylphenol polyethoxylates by using HILIC×RPLC methodology. Presented at *37th International Symposium on High Performance Liquid Phase Separations and Related Technologies (HPLC 2011)*, Dalian, China, 8-11 October 2011.

YH Nai, ML Gutierrez Zamora, O Zemb, M Manefield, S Powell, MC Breadmore. A new approach for characterisation of microbial communities. Presented at *26th International Symposium on MicroScale Bioseparations (MSB 2011)*, San Diego, USA, 1-5 May 2011.

PN Nesterenko. Application of nanodiamond based stationary phases in separation science. Presented at *Separation Science Asia 2011*, Biopolis, Singapore, 27-28 July 2011.

B Paull. Capillary chelation ion chromatography using monolithic chelating ion exchangers. Invited paper presented at *Pittsburgh Conference on Analytical Chemistry (Pittcon 2011)*, Atlanta, USA, 13-18 March 2011.

B Paull. Functional composite phases for biomolecule extraction and separation. Invited paper presented at *European Lab Automation (ELA 2011)*, Hamburg, Germany, 30 June - 1 July 2011.

publications

B Paull. Production and characterisation of polymer monoliths: Trials and tribulations. Plenary paper presented at *Separation Science Asia 2011*, Biopolis, Singapore, 27-28 July 2011.

B Paull. Production, characterisation and application of 'MonoPLOT' open tubular capillary columns. Invited paper presented at *11th Asia-Pacific International Symposium on Microscale Separations and Analysis (APCE 2011)*, Hobart, Australia, 27-30 November 2011.

B Paull. Nano/micro-structured monolithic phases for in-capillary extraction, derivitisation and separation. Invited paper presented at *35th International Symposium on Capillary Chromatography (ISCC 2011)*, San Diego, USA, 1-5 May 2011.

B Paull, D Connolly, P Floris, H Alwael. Modification of polymer monoliths with nano-particles for bioanalytical micro-extraction, separation and flow-through reactors. Invited paper presented at *Pittsburgh Conference on Analytical Chemistry (Pittcon 2011)*, Atlanta, USA, 13-18 March 2011.

H Ritchie, M Camenzuli, GR Dennis, RA Shalliker. Improving two-dimensional peak capacity and separation efficiency with segmented flow chromatography columns. Invited oral presentation at *Pittsburgh Conference on Analytical Chemistry (Pittcon 2011)*, Atlanta, USA, 13-18 March 2011.

H Ritchie, M Camenzuli, GR Dennis, RA Shalliker. Understanding column bed heterogeneity in the quest for improved separation efficiency. Invited oral presentation at *37th International Symposium on High Performance Liquid Phase Separations and Related Technologies (HPLC 2011)*, Budapest, Hungary, 19-23 June 2011.

H Ritchie, M Camenzuli, J LaDine, RA Shalliker. The design of a new concept chromatography column. Invited oral presentation at *Separation Science Asia 2011*, Biopolis, Singapore, 27-28 July 2011.

RA Shalliker, M Camenzuli, H Ritchie, J LaDine. Using parallel segmented flow chromatography columns for high efficiency in HPLC with hyphenated methods of detection. Invited oral presentation at *11th Asia-Pacific International Symposium on Microscale Separations and Analysis (APCE 2011)*, Hobart, Australia, 27-30 November 2011.

RA Shellie. Comprehensive approach for monitoring fate of environmental fuel spill. Presented at *8th GC×GC Symposium*, San Diego, USA, 1-5 May.

P Smejkal, MC Breadmore, S Powell, F Foret, RM Guijt, F Bek, M Macka. Chip-ITP with indirect fluorescence detection for on-site analysis. Invited oral presentation at *18th International Symposium on Electro- and Liquid Phase Separation Techniques (ITP 2011)*, Tbilisi, Georgia, 28-30 August 2011.

P Smejkal, N Nuchtachvorn, YS Gee, YH Nai, MC Breadmore, S Powell, F Foret, RM Guijt, L Suntornsuk, F Bek, M Macka. Microfluidic electrophoresis with LIF and LED fluorescence detection for biomedical diagnostics and on-site analysis: How flexible can a fixed-design chip-CE system be? Invited oral presentation at *11th International Nutrition and Diagnostics Conference (INDC 2011)*, Brno, Czech Republic, 28-30 August 2011.

Other conference presentations

P Castignolles, M Mnatsakanyan, R Roi, A Medina-Oliva, J Thevarajah, D Taylor, C Ferris. M in Het Panhuis, M Destarac, M Schmidt, A Lauto, M Gaborieau. Capillary electrophoresis in the critical conditions for polymers. *11th Asia-Pacific International Symposium on Microscale Separations and Analysis (APCE 2011)*, Hobart, Australia, 27-30 November 2011.

ST Chin, PJ Marriott, GT Eyres. An approach for identification of potent odorants in wine and coffee brew using gas chromatography-olfactometry and comprehensive gas chromatography. Presented at *13th Weurman Flavour Research Symposium*, Zaragoza, Spain, 27-30 September 2011.

ST Chin, PJ Marriott, GT Eyres. An approach for identification of potent odorants in wine and brewed coffee using gas chromatography-olfactometry and comprehensive two-dimensional gas chromatography. Presented at *19th Annual RACI Analytical & Environmental Divisions Research and Developments Topics Conference*, Melbourne, Australia, 6-9 December 2011.

GW Dicinoski. Introduction to modern ion chromatography. Presented at *23rd International Ion Chromatography Symposium (IICS 2011)*, Rhode Island, USA, 16-19 October 2011.

RD Henderson, RM Guijt, AD Henderson, TW Lewis, EF Hilder, PR Haddad, MC Breadmore. Complete polymer electrophoresis microchip with integrated high voltage and detection electrodes. Presented at *15th Micro Total Analysis Systems (μTAS 2011)*, Seattle, USA, 2-6 October 2011.

JP Hutchinson, M Khandagale, J Li , W Farrell, E Groeber, R Szucs, GW Dicinoski, PR Haddad. Non-discriminatory, universal and sensitive detection technologies for fluid based separation techniques. Presented at *36th International Symposium on High Performance Liquid Phase Separations and Related Techniques (HPLC 2011)*, Budapest, Hungary, 19-23 June 2011.

L Kim, J Vine, K Tuck, PJ Marriott. Characterisation of flephedrone and two mephedrone – meow meow – analogues using NMR spectroscopy, GC/MS and FTMS/ESI. Presented at *19th Annual RACI Analytical and Environmental Divisions Research and Developments Topics Conference*, Melbourne, Australia, 6-9 December 2011.

B Maikhunthod, PJ Marriott. Identification of aroma-key compounds of fennel seeds as quality index for consumer perception. Presented at Joint Congress: 35th International Symposium on Capillary Chromatography, *26th International Symposium on MicroScale Bioseparations, 8th GC×GC Symposium (ISCC, MSB and GC×GC)*, San Diego, USA, 1-5 May 2011.

EP Mateus, MJ Cabrita, R Garcia, MG da Silva, PJ Marriott. One dimensional and comprehensive two-dimensional gas chromatography analysis of acacia, cherry, chestnut and oak woods with different toasting degrees. Presented at *11th Asia-Pacific International Symposium on Microscale Separations and Analysis (APCE 2011)*, Hobart, Australia, 27-30 November 2011.

EP Mateus, AB Ribeiro, MN Couto, MG da Silva, PJ Marriott. Rice volatile emissions: Characterisation by comprehensive chromatography. Presented at *11th Asia-Pacific International Symposium on Microscale Separations and Analysis (APCE 2011)*, Hobart, Australia, 27-30 November 2011.

OG Potter, ME Thomas, EF Hilder, MC Breadmore. Microscale photolytic eluent generation for chromatography. Presented at *15th Micro Total Analysis Systems (μTAS 2011)*, Seattle, USA, 2-6 October 2011

M Ryvolová, L Krčmová, T Piasecki, P Smejkal, N Nuchtavorn, M Akhter, F Foret, L Suntornsuk, P Maaskant, MC Breadmore, M Macka. Solid-state light sources: The 21st century light sources for miniaturised and portable analysis. Oral presentation at *16th Euroanalysis*, Belgrade, Serbia, 11-15 September 2011.

M Sahl, R Roi, J Thevarajah, B Ahling, M Mnatsakanyan, M Schmidt, A Lauto, M Gaborieau, P Castignolles. Structure and molecular weight of chitosan and polypeptides. *32nd Australasian Polymer Symposium (APS 2011)*, Sydney, Australia, 13-16 February 2011.

K Samykanno, E Pang, PJ Marriott. Environmental effects on the volatile profiles of Australian strawberry varieties. Presented at Joint Congress: 35th International Symposium on Capillary Chromatography, 26th International Symposium on MicroScale Bioseparations, *8th GC×GC Symposium (ISCC, MSB and GC×GC)*, San Diego, USA, 1-5 May 2011.

P Smejkal, MC Breadmore, F Foret, RM Guijt, F Bek, M Macka. Chip-based isotachophoresis (chip-ITP) with indirect fluorescence detection using a field-deployable bioanalysis platform. Presented at *11th Asia-Pacific International Symposium on Microscale Separations and Analysis (APCE 2011)*, Hobart, Australia, 27-30 November 2011.

P Smejkal, N Nuchtachvorn, MC Breadmore, F Foret, RM Guijt, F Bek, L Suntornsuk, M Macka. Microfluidic chip-CE-LIF custom application oriented platform: Exploring the full potential as a generic rapid portable analyser. Presented at *2nd Australia and New Zealand Micro and Nanofluidics Symposium (ANZ MNS 2011)*, Sydney, Australia, 28-29 April 2011.

P Smejkal, N Nuchtachvorn, YS Gee, YH Nai, MC Breadmore, S Powell, F Foret, RM Guijt, L Suntornsuk, F Bek, M Macka. Microfluidic electrophoresis with LIF and LED fluorescence detection for biomedical diagnostics and on-site analysis: How flexible can a fixed-design chip-CE system be? Oral presentation at *36th International Symposium on High Performance Liquid Phase Separations and Related Techniques (HPLC 2011)*, Budapest, Hungary, 19-23 June 2011.

BK Tan, CG Li, PJ Marriott. Analysis of volatile organic compounds in traditional Chinese medicines by comprehensive two-dimensional gas chromatography. Presented at *19th Annual RACI Analytical & Environmental Divisions Research and Developments Topics Conference*, Melbourne, Australia, 6-9 December 2011.

BK Tan, CG Li, PJ Marriott. Analysis of volatile organic compounds in traditional Chinese medicines by comprehensive two-dimensional gas chromatography. Presented at *Separation Science Asia 2011*, Biopolis, Singapore, 27-28 July 2011.

ZY Wu, PJ Marriott. Comprehensive analysis of selected nonylphenol polyethoxylates by NPLC fractionation with GC/MS and prep-GC-NMR. Presented at *19th Annual RACI Analytical & Environmental Divisions Research and Developments Topics Conference*, Melbourne, Australia, December 2011.

ZY Wu, PJ Marriott. Comprehensive analysis of selected nonylphenol polyethoxylates by NPLC fractionation with GC/MS and prep-GC-NMR. Presented at 2nd Dalian International Symposium and Exhibition on Chromatography and Related Techniques, *37th International Symposium on High Performance Liquid Phase Separations and Related Techniques*, Dalian, China, 8-10 October 2011.

ZY Wu, ZD Zeng, PJ Marriott. Qualitative analysis of nonylphenol isomers by gas chromatography-mass spectrometry combined with chemometric resolution. Presented at Joint Congress: *35th International Symposium on Capillary Chromatography, 26th International Symposium on MicroScale Bioseparations, 8th GC×GC Symposium (ISCC, MSB and GC×GC)*, San Diego, USA, 1-5 May 2011.

publications

Lectures to Universities and Companies

P Castignolles. Critical conditions capillary electrophoresis for the separation of complex copolymers: Polyelectrolytes and polysaccharides. Invited seminar presented at Sonderforschungsbereich 625 (SFB 625), University of Mainz, Germany, January 2011.

P Castignolles. Critical conditions capillary electrophoresis for the separation of complex copolymers: Polyelectrolytes and polysaccharides. Invited seminar at Agilent Capillary Electrophoresis User Meeting, Sydney, Australia, March 2011.

P Castignolles. Separation and characterization of branched polymers, polyelectrolytes and natural polymers by SEC and capillary electrophoresis. Invited seminar presented at Rhodia Aubervilliers, France, January 2011.

P Castignolles. Separation and characterization of complex polymers (branched, charged, natural) by SEC and capillary electrophoresis. Invited seminar presented at the National Institute for Applied Science (INSA), Lyon, France, January 2011.

PR Haddad. Invited seminar presented at Montana State University, Montana, USA, 9 March 2011.

EF Hilder. Nanostructured polymeric materials for applications in separation science. Presented at Department of Chemistry, Montana State University, Montana, USA, 6 May 2011.

EF Hilder. Nanostructured polymeric materials for applications in separation science. Presented at School of Chemistry, University of New South Wales, Sydney, Australia, 6 September 2011.

EF Hilder. Novel monolithic cryopolymers for efficient capillary chromatography of biomolecules. Presented at Department of Analytical Chemistry, Johannes Kepler University, Linz, Austria, 29 June 2011.

EF Hilder. Novel monolithic cryopolymers for efficient capillary chromatography of biomolecules. Presented at The Molecular Foundry, Lawrence Berkeley National Laboratory, California, USA, 13 May 2011.

M Macka. CE by use of chip technology: Agilent bioanalyzer as a generic chip based capillary electrophoresis analyser. Invited seminar presented at Agilent Users' Meeting, University of Technology, Sydney, Australia, 9 March 2011.

M Macka. CE microfluidic electrophoresis with LIF and LED fluorescence detection for biomedical diagnostics and on-site analysis: How flexible can a fixed-design chip-CE system be? Invited seminar presented at Mahidol University, Bangkok, Thailand, 15 June 2011.

M Macka. CE microfluidic electrophoresis with LIF and LED fluorescence detection for biomedical diagnostics and on-site analysis: How flexible can a fixed-design chip-CE system be? Invited seminar presented at Thammasat University, Bangkok, Thailand, 17 June 2011.

M Macka. Miniaturised and portable analysis: Promises of the past, expectations nowadays, and possible reality in the future? Invited seminar presented at Griffith University, Queensland, Australia, 12 Dec 2011.

M Macka. Microfluidic chip analysis with fluorescence detection using a commercial field-deployable platform. Invited seminar presented at Mendel University in Brno, Czech Republic, 1 July 2011.

M Macka. Microfluidic electrophoresis with LIF and LED fluorescence detection for biomedical diagnostics and on-site analysis. Invited seminar presented at Institute of Analytical Chemistry, Academy of Sciences of the Czech Republic, Brno, Czech Republic, 27 June 2011.

M Macka. On-site analysis and separations with microfluidic chip electrophoresis: How flexible can a fixed-design chip-CE system be? Invited seminar presented at Centre Microélectronique de Provence, Ecole Nationale Supérieure des Mines de Saint Etienne (EMSE), Gardanne, France, 7 July 2011.

PJ Marriott. A common platform or volatiles, pesticides and metabolites analysis: Comprehensive two-dimensional gas chromatography. Presented at Korean Tobacco and Ginseng Company (KT&G), Daejeon, South Korea, August 2011.

PJ Marriott. Advanced hyphenated GC methods for chemical profiling in the life and chemical sciences. Presented at Agilent Users Group at Korean Society of Mass Spectrometry, Busan, South Korea, August 2011.

PJ Marriott. Advances in the science of separations and spectroscopy. Presented at Total Agilent Experience, Thailand, June 2011.

PJ Marriott. Cryogenics in chromatography: A resolution revelation. Presented at Monash University, Melbourne, March 2011.

PJ Marriott. Cryogenics in gas chromatography: A (cold) voyage to discovery. Presented at CSIRO Clayton, Melbourne, Australia, May 2011.

PJ Marriott. GC×GC and food chemistry. Presented at CSIRO Food and Nutritional Sciences Division, Victoria, Australia, April 2011.

PJ Marriott. GC×GC for advanced pesticides analysis. Presented at Total Agilent Experience, Singapore, May 2011.

PJ Marriott. Hot and cold gas chromatography for molecular discovery. Presented at Inha University, Incheon, South Korea, August 2011.

PJ Marriott. Hot and cold gas chromatography for molecular discovery. Presented at New University of Lisbon, Portugal, June 2011.

PJ Marriott. Some novel and unusual applications of SPME in multidimensional GC. Presented at Royal Australian Chemical Institute Analytical Group, Melbourne, Australia, September 2011.

PJ Marriott. Tricks and techniques in solid-phase micro-extraction. Presented at Korean Food Research Institute (KFRI), Seoul, South Korea, August 2011.

Workshops

PJ Marriott. Comprehensive two-dimensional gas chromatography workshop. Presented at *Joint Congress: 35th International Symposium on Capillary Chromatography, 26th International Symposium on MicroScale Bioseparations, 8th GC×GC Symposium (ISCC, MSB and GC×GC)*, San Diego, USA, 1-5 May 2011.

PJ Marriott. Multidimensional gas chromatography workshop. Presented at Chung-Ang University, Seoul, South Korea, 19 Aug 2011.

PJ Marriott. Short course in comprehensive two-dimensional gas chromatography. Presented at New University of Lisbon, Portugal, 22 June 2011.

PJ Marriott. B Mitrevski, ST Chin. Multidimensional gas chromatography workshop. Presented at Monash University, Melbourne, 5 July 2011.

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