Department of Pure & Applied Chemistry

Academic Staff and Research Interests

Bionanotechnology & Analytical

Academic Staff and Research Interests

Research in Bionanotechnology and Analytical Chemistry is broad-ranging. Our bionanotechnology research is focused on the application of nanoscience to solve biological problems most notably with applications in healthcare. There is significant critical mass in the study and the application of Raman, surface enhanced Raman scattering and functionalisation of nanoparticles to create new clinical tools. We have expertise in imaging, plasmonic sensors, infrared spectroscopy for clinical diagnostics, the development of peptides as biological mimics and the application of new chemiluminescence approaches to biological measurements. Our analytical research is focussed on process analytical chemistry, environmental chemistry, and conservation science. Atomic and molecular spectrometry, chemometrics, chromatography, materials analysis and optical spectroscopies are used extensively in the development of these areas. Our specific skills lie in accurate analytical measurement of molecules, developing new instrumentation and techniques, development of bioanalytical assays and chemical reagents for use in rapid and highly sensitive detection approaches.

For more information, please visit:
https://www.strath.ac.uk/research/subjects/chemistry/bionanotechnologyanalyticalchemistry/

Staff Members	*Research Interests*
Dr Matthew Baker	*Infrared spectroscopy, biofluid analysis, imaging, forensics.*
Dr Christine M. Davidson	*Analytical chemistry, environmental chemistry, chemical speciation, potentially toxic elements.*
Dr Lynn Dennany	*Electrochemiluminescence, electroanalytical, biosensors, nanomaterials, forensics.*
Dr Robert Edkins	Luminescence spectroscopy, synthesis of fluorescent imaging agents and molecular probes, photodynamic and photothermal therapies
Professor Karen Faulds	*Surface enhanced Raman spectroscopy (SERS), functionalised nanoparticles, bio-recognition molecules, bioanalytical sensors.*
Dr Lorraine T. Gibson	*Indoor air pollution, environmental remediation and detection (organic pollutants and potentially toxic elements), silica nanoparticles for pollutant removal, heritage science, conservation.*
Professor Duncan Graham	*Surface enhanced Raman scattering (SERS), functionalised nanoparticles, biomolecular analysis.*
Dr Aaron Lau	*Bioinspired materials, protein- and cell-surface interactions, peptoids, enzymes, surface modification, nanopores and nanoporous membranes.*
Dr Alison Nordon	*Process analysis, chemometrics, design of experiments, in situ measurements, optical spectroscopy, acoustics, NMR spectroscopy.*
Dr Alastair Wark	*Nanoparticles, biosensors, spectroscopic imaging and tracking, surface chemistry, analytical and physical chemistry.*

Dr Matthew J. Baker

Research Interests

Contact Details

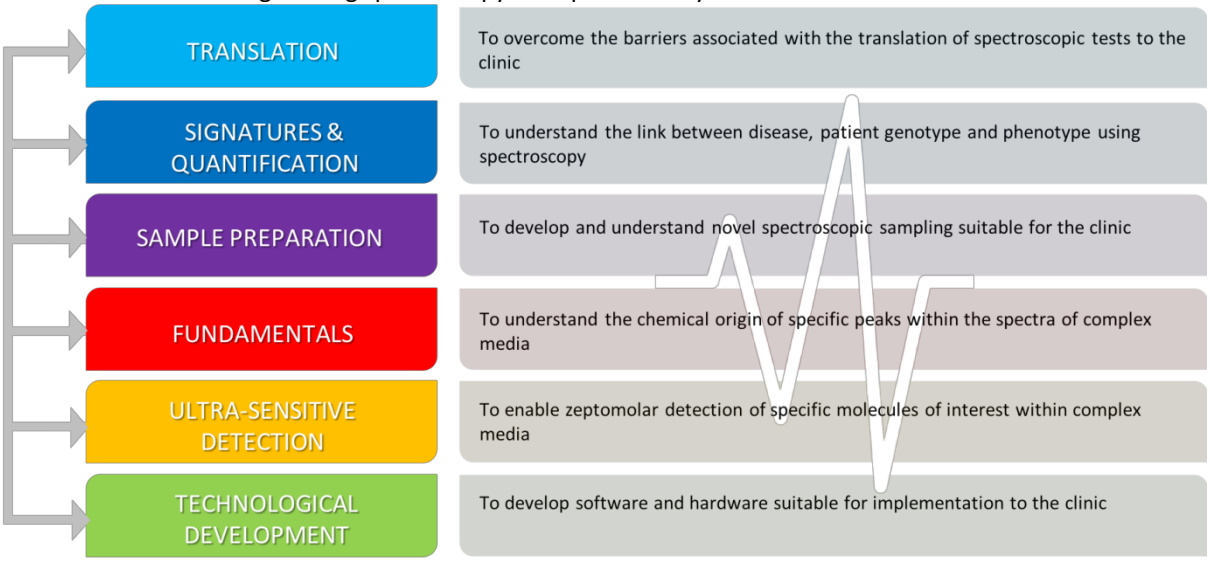
Phone: +44 (0)141 548 4700; Email: matthew.baker@strath.ac.uk

Career Synopsis

- 2018 – present: Forensic Science Lead, Pure and Applied Chemistry
- 2017 – present: Reader in Chemistry, Pure and Applied Chemistry
- 2015 – present: Director of Knowledge Exchange, Pure and Applied Chemistry
- 2014 – 2017: Senior Lecturer in Chemistry, University of Strathclyde,
- 2012 – 2014: Senior Lecturer in Toxicology and Analytical Chemistry, University of Central Lancashire
- 2010 – 2012: Senior Scientist, Research Scholar and Project Manager, Defence Science and Technology Laboratory (Dstl), Porton Down
- 2007 – 2010: EPSRC Life Science Interface Fellow, University of Manchester, Harvard Medical School and Robert-Koch Institute, Berlin

To impact upon life via understanding the composition and behaviour of molecules in complex media

Our research focuses upon understanding the composition and behaviour of molecules within complex matrices related to real-world detection challenges using spectroscopy and spectrometry



For further information please visit: http://www.strath.ac.uk/staff/bakermatthewdr/

Selected Publications

1. Grau E et al. BMJ Open, 2018, 8, e017593
2. Fritzsch R et al. Analytical Chemistry, 2018, 90(4), 2732-2740
3. M. J. Baker et al. Chem. Soc. Rev., 2016, 45, 1803-1818
4. Hughes C et al. Scientific Reports, 2016, 6:20173
5. M. J. Baker et al. Nature Protocols, 2014, 9(8), 1771-1791

Dr Christine M. Davidson

Contact Details

Phone: +44 (0)141 548 2134; Email: c.m.davidson@strath.ac.uk

Career Synopsis

- 2018 – present: Reader, University of Strathclyde
- 2009 – present: Postgraduate Co-ordinator, University of Strathclyde
- 1999 – 2018: Senior Lecturer, University of Strathclyde
- 1989 – 1999: Lecturer, University of Strathclyde
- 1988 – 1989: PDRA, Scottish Universities Research Reactor Centre
- 1987 – 1988: PDRA, University of Utrecht, Netherlands

Research Interests

Analytical chemistry, environmental chemistry, chemical speciation, potentially toxic elements

Our international team carries out research across the breadth of environmental analytical chemistry, from the development of new methods of analysis to applied studies focussing on air, soil and water. Much of our work is collaborative and we are also active in KTP projects involving measurement science.

Analytical Method Development
The Group has been active for many years in developing atomic spectrometry and chemical extraction methods that provide information on risk to human health and the environment, including the BCR sequential extraction procedure [1] now used worldwide. We are currently interested in bioaccessibility tests for pollutants in soils, microplastics and airborne particles [2]; mercury determination and speciation [3]; and the development of simple colorimetric metal sensors for on-site use [4]. A recent project studied laser induced breakdown spectroscopy for measurement of nitrogen in terrestrial and Martian soils [5].

Environmental Studies
Urban geochemistry is a major research focus for the Group. We have been involved in studies featuring soils and sediments across Europe [6] and in Africa, particularly the City of Lagos, Nigeria [7] where we are researching the impact of e-waste recycling. Our current interests also include the levels, speciation and biogeochemistry of potentially toxic elements (PTE) in upland reservoirs; investigation of the role of plastics in transporting PTE in marine systems; work on urban dusts and airborne particular matter; and collaborative studies with Dr Lorraine Gibson on persistent organic pollutants.

For further information please visit: http://www.strath.ac.uk/chemistry/staff/academic/christinedavidson/

Selected Publications

1. J. R. Bacon, C. M. Davidson, *Analyst*, **2008**, *132*, 25-46.
2. J. A. H. Alpofead, C. M. Davidson, D. Littlejohn, *Anal. Methods*, **2016**, *8*, 5466-5475.
3. A. T. Reis, C. M. Davidson, C. Vale, E. Pereira, *Trends Anal. Chem.*, **2016**, *82*, 109-117.
4. O. Cavoura, C. M. Davidson, N. Katsiris and H. E. Keenan, *Environ. Monit. Assess.*, **2018**, *190*, Article 236
5. X. T. Yan, K. M. Donaldson, C. M. Davidson, Y. Gao, H. Wu, A. M. Houston and A Kisdi, *RSC Advances*, **2018,** *8*, 36886-36894.
6. S. Rodriguez, G. Urquhart, I. Hossack, M. E. Pereira, A. C. Duarte, C. Davidson, A. Hursthouse, P. Tucker and D. Robertson, *Environ. Chem. Lett.*, **2009**, *7*, 141-148.
7. A. O. Oyeyiola, C. M. Davidson, K. O. Olayinka, B. I. Alo, *Environ. Monit. Asses.,* **2014**, *186*, 7321–7333.

Dr Lynn Dennany

Contact Details

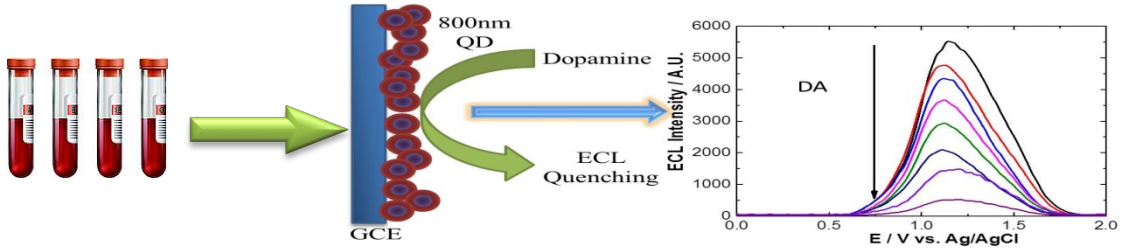
Phone: +44 (0)141 548 4322; Email: lynn.dennany@strath.ac.uk

Career Synopsis

- 2016 – present: Senior Lecturer, University of Strathclyde
- 2010 – 2016: Lecturer, University of Strathclyde
- 2007 – 2010: Research Fellow, Intelligent Polymer Research Institute, University of Wollongong
- 2004 – 2006: Postdoctoral Researcher, Biomedical Diagnostics Institute, Dublin City University

Research Interests

Electroanalytical, Biosensors, Electrochemiluminescence (ECL), Nanomaterials,



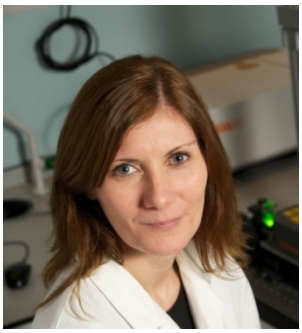
My research interests focus on the application of analytical detection techniques for chemical and biochemical sensor development. Within this, my group researches three core areas:
(1) *novel materials*, including nanoparticles, monomeric and polymeric materials;
(2) development of robust surface attachment strategies for *enhanced ECL sensitivities* and *multiplexed detection*; and
(3) the creation of novel *advance methodologies for ultrasensitive disease biomarker detection* that will alter and improve clinical practice.

In particular, the detection of oxidative stress leading to mutagenesis, neurological diseases and aging and the early detection of biomarkers for disease detection are continuing themes within my research group. I am also keenly interested in the development of novel materials for detection and biomedical device applications as well as finding new avenues to apply these new materials. Currently I am undertaking research on wearable sensors in collaboration with Buddi Ltd through a Knowledge Transfer Partnership.
For further information, please visit: http://www.strath.ac.uk/staff/dennanylynndr/

Selected Publications

1. A.J. Stewart, K. Brown, L. Dennany, *Anal Chem*, **2018**, **DOI:** 10.1021/acs.analchem.8b03572
2. E.J. O'Reilly, T.E. Keyes, R.J. Forster, L. Dennany, *Electrochem Comm*, **2018**, *86*, 90-93.
3. H. Holtkötter, V Beyer, K Schwender, A Glaub, KS Johann, M Schürenkamp, U Sibbing, S Banker, H Pfeiffer, L. Dennany, M Vennmann, *FSI Gen*, **2017**, *29*, 261-268.
4. L. Shaw, L. Dennany, *Current Opinions in Electrochemistry*, **2017**, *3 (1)*, 23-28.
5. S.S. Tobe, Y.C. Swaran, L. Dennany, L.A. Welch, M. Vennemann, *International Journal of Legal Medicine,* **2016**,*131 (1)*, 87-94.
6. R. Russell, A.J. Stewart, L. Dennany, *Anal. Bioanal. Chem.,* **2016**, *408*, 7129 - 7136.

Professor Karen Faulds



Contact Details

Phone: +44 (0)141 548 2507; Email: karen.faulds@strath.ac.uk

Career Synopsis

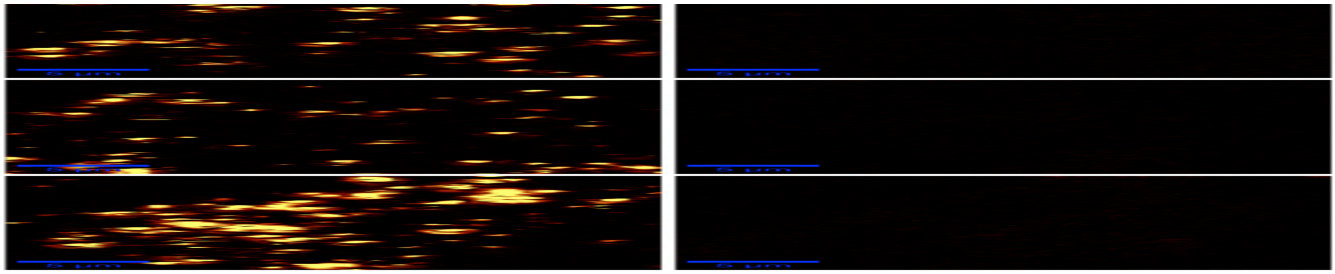
- 2015-present Head of Bionanotechnology and Analytical Chemistry
- 2015-present: Professor, University of Strathclyde
- 2014 – present: Strathclyde Director of CDT in Optical Medical Imaging,
- 2006 – 2015: Lecturer, Senior Lecturer (2010) and Reader (2012), University of Strathclyde
- 2004 - 2006: Postdoctoral Researcher (BBSRC), University of Strathclyde
- 2003 – 2004: Postdoctoral Researcher (DTI Measurements for Biotechnology Programme), University of Strathclyde

Research Interests

Surface enhanced Raman spectroscopy (SERS), functionalised nanoparticles, bio-recognition molecules, biomolecule detection.

Research focuses on using surface enhanced Raman scattering (SERS) to create new approaches to bioanalysis for use in the life and clinical sciences. SERS is a spectroscopic technique that offers significant advantages over other established techniques such as fluorescence and our research has focused on highlighting the advantages, creating new examples of increased capability in life science applications and interacting with end users to shape future step changes in research. Our research centres around using the inherent sensitivity of SERS for the detection of target DNA or proteins using signal amplification methods to enhance the signal rather than using target amplification methods such as PCR. Work has focussed on exploiting the sensitivity of SERS for quantitative analysis of biomolecules as well as exploiting one of the key advantages of SERS, the ability to analyse multiple analytes in one sample. This allows more information to be gained per analysis as well as giving information about complex systems that are intrinsically difficult to measure.

In vitro Diagnostics: Development of quantitative, multiplexed assays for the detection of target biomolecules, DNA, proteins and bacteria using surface enhanced Raman (SERS).



Imaging: Raman, SERS and SESORS imaging of nanoparticles functionalised with biorecognition molecules for the detection of bacterial pathogens and cancer.

Selected Publications

1. F. Nicolson, L.E. Jamieson, S. Mabbott, K. Plakas, N. Shand, M. Detty, D. Graham, K. Faulds, *Chem. Sci.*, **2018**, 9, 3788-3792
2. F. Nicolson, L.E. Jamieson, S. Mabbott, K. Plakas, N.C. Shand, M.R. Detty, D. Graham, K. Faulds, *Chem. Commun.*, **2018**, 54 (61), 8530-8533
3. H. Kearns, R. Goodacre, L. E. Jamieson, D. Graham, K. Faulds, *Anal. Chem.*, **2017**, 89 (23), 12666–12673
4. S. Laing, K. Gracie, **K. Faulds***, *Chem. Soc. Rev.*, **2016**, 45(7), 1901-1918.
5. K. Gracie, E. Correa, S. Mabbott, J. A. Dougan, D. Graham, R. Goodacre, **K. Faulds***, *Chem. Sci.*, **2014**, *5* (3), 1030.

Dr Lorraine T. Gibson

Contact Details

Phone: +44 (0)141 548 2224; Email: lorraine.gibson@strath.ac.uk

Career Synopsis

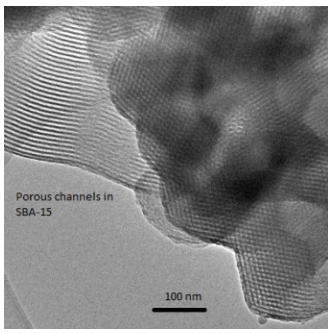
- 2006 – present: Senior Lecturer, University of Strathclyde
- 1999 – 2006: Lecturer, University of Strathclyde
- 1998 – 1999: Research Fellow, Instituut Collectie Nederlands, Amsterdam, The Netherlands.
- 1995 – 1999 NERC Postdoctoral Research Fellow, University of Strathclyde.

Research Interests

Environmental Analytical chemistry, novel remediation materials and technologies, indoor air monitoring, heritage science and conservation.

Research areas involve interdisciplinary science across chemistry, chemical engineering, material science, environmental chemistry, physics, conservation and heritage.

Environmental remediation: Synthesis, characterisation and analysis of novel adsorption and photochemical platforms to reduce vapour and aqueous phase pollution (organic compounds and potentially toxic elements). Equipment available in the group includes chromatography (HPLC, TD-GC-MS, Headspace-GC-MS), gas generation chambers, spectroscopy (FTIR, UV-VIS, Raman). Accessible equipment within the Department includes; NMR, MS, ICP-MS, BET N2 adsorption, SEM, XRF, XRD. Regular collaborators include Dr Patwardhan (Chemical Engineering), Dr Davidson (Chemistry), Prof Morris (Material Science, UCC), Dr Switzer (Civil Engineering), Ms Bradley (Architecture).



Heritage Science: Examination of indoor air quality and its effects on objects held in heritage collections, development of non-invasive techniques for the examination of modern materials, novel detectors for pesticide identification. Regularly collaborate with the National Records of Scotland, the National Museums of Scotland, the British Museum, the British Library, the Getty Conservation Institute, the Netherlands Institute for Conservation, Art and Science.

For further information please visit: http://www.strath.ac.uk/chemistry/staff/academic/lorrainegibson/

Selected Publications

1. L. T. Gibson, *Chem. Soc. Rev.* **2014**, *43*, 5163–5172.
2. L. T. Gibson, *Chem. Soc. Rev.* **2014**, *43*, 5173–5182.
3. I. Rushworth, L. T. Gibson, *Heritage Science* **2014**, *2:3*.
4. G. Mitchell, C. Higgitt, L. T. Gibson, *Polymer Degrad. Stabil.* **2014**, *107*, 328–340.
5. S. Idris, K. Alotaibi, T. Peshkur, M. Morris, L. T. Gibson, *Micropor. Mesopor. Mat.* **2013**,*165*, 99–105.
6. A. M. Ewhad-Ahmed, M. A. Morris, S. V. Patwardhan, L. T. Gibson, *Environ. Sci. Technol*. **2012**, *46*, 13354–13360.

Professor Duncan Graham

Contact Details

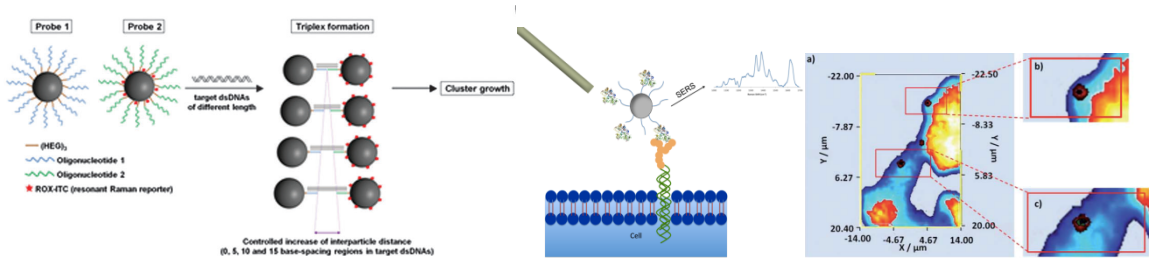
Phone: +44 (0)141 548 4701; Email: Duncan.graham@strath.ac.uk

Career Synopsis

- 2016 – present: Head of Department, Pure and Applied Chemistry
- 2008 – 2015: Head of Research, Pure and Applied Chemistry
- 2005 – present: Director Centre for Molecular Nanometrology
- 2004 – present: Professor, University of Strathclyde,
- 2002 – 2004: Lecturer then Senior Lecturer, University of Strathclyde
- 1997 – 2002: BBSRC David Phillips five-year fellow

Research Interests

Analytical and Biological Chemistry, Biomolecular Analysis, Nanoparticles, SERS



The main focus is the creation of a range of functionalised metallic nanoparticles which can be used for a variety of different purposes which include the diagnosis of disease and also the treatment of disease. This includes the chemical manipulation of the appropriate surface molecules and labels required to turn these metal nanoparticles into functioning nanosensors capable of detecting single molecules in complex environments using SERS. In addition, the mounting of therapeutic agents onto these nanoparticles has resulted in significantly increased performance of the drugs when tested against particular disease states.

Personal webpages: http://www.strath.ac.uk/staff/grahamduncanprof/
http://twitter.com/duncangraham70

Selected Publications

1. In vivo multiplex molecular imaging of vascular inflammation using surface-enhanced Raman spectroscopy, Noonan, J., Asiala, S., Grassia, G., MacRitchie, N., Gracie, K., Carson, J., Moores, M., Girolami, M., Bradshaw, A., Guzik, T.J., Meehan, G. R., Scales, H., Brewer, J.M., McInnes, I.B., Sattar, N., Faulds, K., I Garside, P., **Graham, D.***, Maffia, P.* ***Theranostics***, **2018**, In press.
2. Ratiometric Raman imaging reveals the new anti-cancer potential of lipid targeting drugs, Jamieson, L., Wetherill, C., Faulds, K., **Graham, D.***, ***Chemical Science***, 2018, 9, 6935-6943.
3. Nanosensing protein allostery using a bivalent MDM2 assay, Robson, A.F., Hupp, T.R.,* Lickiss, F., Ball, K.L., Faulds, K., Graham, D.* ***Proceedings of the National Academy of Sciences, USA*, 2012**, 109, 21, 8073-8078.
4. Tuning the Interparticle Distance in Nanoparticle Assemblies in Suspension via DNA-Triplex Formation: Correlation Between Plasmonic and Surface-enhanced Raman Scattering Responses, Guerrini, L., McKenzie, F., Wark, A.W., Faulds, K., Graham, D.* ***Chemical Science***, **2012**, 3 (7), 2262 - 2269.
5. Gold nanoparticles for the improved anticancer drug delivery of the active component of oxaliplatin, Brown, S.D., Nativo, P., Smith, J., Stirling, D., Edwards, P.R., Venugopal, B., Flint, D.J., Plumb, J.A., Graham, D.*, Wheate, N.J.* ***Journal of the American Chemical Society***, **2010**, 132, 4678–4684.
6. Control of Enhanced Raman Scattering Using a DNA Based Assembly Process of Dye Coded Nanoparticles, Graham, D.,* Thompson, D., Faulds, K., Smith, W.E., ***Nature Nanotechnology***, **2008**, 3, 9, 548-551.

Dr K H Aaron Lau

Contact Details

Phone: +44 (0) 141 548 2162; Email: aaron.lau@strath.ac.uk

Career Synopsis

- 2013 – present: Lecturer (Assistant Professor), University of Strathclyde
- 2011 – 2013: US NIH National Research Service Award postdoctoral fellow
- 2008 – 2011: Postdoctoral fellow, Northwestern University, USA

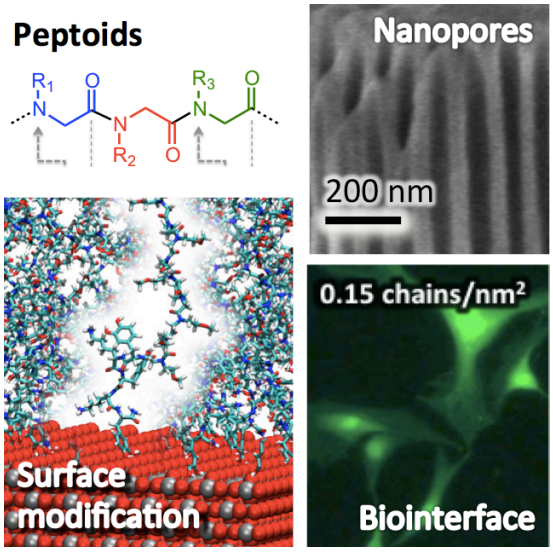
Research Interests

Biocatalysis, protein separation, surface modification/functionalization, enzyme immobilization, stem cells, nanoporous membranes, hydrogels, self-assembly, peptides and "peptoids", SPR, XPS

My interest is in creating new materials and surfaces with molecular functionalities inspired by nature (i.e. "bioinspired interfacial materials"). Core expertise lie in 1) the modification of surfaces with proteins, polymers and other small molecules, 2) design and synthesis of peptides and "peptoids", and 3) characterization of self-assembled nanostructures as well as surfaces (e.g. SPR, XPS, DLS, fluorescence microscopy, water contact angle).

Peptoid Biointerfaces and Biomaterials

Peptide-mimetic "peptoid" polymers can be conveniently synthesized to emulate the finely tuned chemistry of proteins and other biomolecules. Peptoid surfaces can be tailored for antibacterial and antifouling applications, for enabling high sensitivity (small) molecule sensing, and for controlling (stem) cell culture.



Nanoporous Membrane Separation

Nanopores aligned within membranes, modified with suitable molecules, enable control of biomolecular diffusion and hence molecular separation.

Surface Modification

Inspired by the simplicity and biochemical functionality of tea, polyphenol coatings enable convenient, water-based approaches for modifying the wetting behaviour of materials and chemical resins, as well as for attaching proteins and polymers on virtually any surface.

For further information, please visit www.lau-lab.com

Selected Publications

1. "Highly Active Protein Surfaces Enabled by Plant-Based Polyphenol Coatings", *ACS Appl. Mater. Interfaces* (2018; *accepted*). DOI: 10.1021/acsami.8b13793
2. "Biocatalytic Self-Assembly Using Reversible and Irreversible Enzyme Immobilization", *ACS Appl. Mater. Interfaces*, 9, 3266 (2017). DOI: 10.1021/acsami.6b13162
3. "Self-Assembly of Ultra-Small Micelles from Amphiphilic Lipopeptoids", *Chem. Commun.*, 53, 2178 (2017). DOI: 10.1021/acsami.6b13162
4. "Molecular Design of Antifouling Polymer Brushes using Sequence-Specific Peptoids", *Adv. Mater. Interf.* 2, 1400225 (2015). DOI: 10.1002/admi.201400225
5. "Peptoids for Biomaterials Science", *Biomaterials Sci.*, 2, 627 (2014). DOI: 10.1039/C3BM60269A

Dr Alison Nordon

Contact Details

Phone: +44 (0)141 548 3044; Email: alison.nordon@strath.ac.uk

Career Synopsis

- 2016 – present: Reader, University of Strathclyde
- 2011 – 2016: Senior Lecturer, University of Strathclyde
- 2006 – 2011: Lecturer, University of Strathclyde
- 2004 – 2012: Royal Society University Research Fellow, University of Strathclyde
- 2002 – 2004: Senior Research Fellow, CPACT, University of Strathclyde
- 1998 – 2002: Research Fellow, CPACT, University of Strathclyde

Research Interests

Process analysis, chemometrics, design of experiments, in situ measurements, optical spectroscopy, acoustics, NMR spectroscopy.

Dr Alison Nordon's research interests are in the development of spectroscopic techniques, in conjunction with data analysis tools, for acquisition of physical and/or chemical information in situ and in real-time. We employ a wide range of spectroscopic methods including acoustic techniques (active and passive), optical (uv-visible, mid and near infrared and Raman) and nuclear magnetic resonance. Our research covers fundamental investigations to enhance the understanding of techniques through to application of the techniques across a wide range of industries for process development, monitoring and control. Multivariate analysis procedures are used extensively throughout our research to extract information from typically low resolution and overlapping signals and to explore fusion of data from different sources.

Alison is a member of the Centre for Process Analytics and Control Technology (CPACT), www.cpact.com, and the EPSRC Centre for Continuous Manufacturing and Advanced Crystallisation (CMAC) Future Manufacturing Research Hub, www.cmac.ac.uk.

Personal webpage: http://www.strath.ac.uk/staff/nordonalisondr/

Selected Publications

1. P. Mishra, A. Nordon, J. Tschannerl, G. Lian, S. Redfern, S. Marshall, *Journal of Food Engineering* **2018**, *238*, 70 – 77.
2. A.J. Parrott, P. Dallin, J. Andrews, P.M. Richardson, O. Semenova, M.E. Halse, S.B. Duckett, A. Nordon, *Applied Spectroscopy* https://doi.org/10.1177/0003702818798644
3. P.M. Richardson, A.J. Parrott, O. Semenova, A. Nordon, S.B. Duckett, M.E. Halse, *Analyst* **2018**, *143*, 3442 – 3450.
4. S.N. Thennadil, M. Dewar, C. Herdsman, A. Nordon, E. Becker, *Control Engineering Practice* **2018**, *70*, 40 – 49.
5. R.A. Halliwell, R.M. Bhardwaj, C.J. Brown, N.E.B. Briggs, J. Dunn, J. Robertson, A. Nordon, A.J. Florence, *Journal of Pharmaceutical Sciences* **2017**, *106*, 1874 – 1880.
6. J. Suberu, P.S. Gromski, A. Nordon, A. Lapkin, *Journal of Pharmaceutical and Biomedical Analysis* **2016**, *117*, 522 – 531.
7. M. Tramontana, A. Gachagan, A. Nordon, D. Littlejohn, R. O'Leary, A.J. Mulholland, *Sensors and Actuators A-Physical* **2015**, *228*, 159 – 169.

Dr Alastair W. Wark

Contact Details

Phone: +44 (0)141 548 3084; Email: alastair.wark@strath.ac.uk

Career Synopsis

- 2007 – present: Lecturer in Nanometrology, University of Strathclyde
- 2004 – 2007: Project Scientist, University of California – Irvine, USA
- 2001 – 2004: Postdoctoral Fellow, University of Wisconsin – Madison, USA
- 2000 – 2001: Postdoctoral Fellow, EPFL, Switzerland

Research Interests

Nanoparticles, biosensors, spectroscopic imaging and tracking, surface chemistry, analytical and physical chemistry

Research within our group is based around the joint development of novel nanomaterials and optical techniques for applications spanning across the analytical, biomedical and physical sciences. Key areas include:

Nanoparticle synthesis and functionalisation
A major focus is the development of hybrid nanostructures that can be used for tackling research challenges requiring dynamic measurements in complex biological environments. For example, creating individual metallic nanoparticle-dye conjugates that provide a surface plasmon enhanced optical response across an extended excitation and detection wavelength range from the visible to the infra-red. These are then biofunctionalized for a variety of bioanalytical and biomedical applications.

Multimodal bioimaging and single nanoparticle tracking
Monitoring spatially localized molecular interactions as they happen is particularly powerful for applications such as disease diagnostics and drug & vaccine delivery. We are developing new optical microscopy and nanoparticle-enhanced techniques capable of performing real-time measurements via multiple modalities combining single photon (Raman, fluorescence, dark-field) and multiphoton (CARS, SRS, SHG, 2-photon fluorescence) techniques that can enable ambitious measurements to be tackled in collaboration with researchers from across the biological, physical, and medical research fields.

Ultrasensitive bioaffinity detection
Another long-standing goal is the design of elegant and simple methodologies capable of directly detecting target biomolecules (*e.g.* proteins, nucleic acids) in real-time and at sensitivities approaching just a few molecules. We explore various combinations of surface chemistries and nanoparticle-enhanced analytical techniques to achieve detection limits in the atto- to femtomolar range.

For further information, please see: *http://www.strath.ac.uk/staff/warkalastairdr/*

Selected Publications

1. A. McLintock, C. A. Cunha-Matos, M. Zagnoni, O. R. Millington and A. W. Wark, *ACS Nano* **2014**, *8*, 8600–8609.
2. C. A. Cunha-Matos, O. R. Millington, A. W. Wark and M. Zagnoni, *Lab on a Chip*, **2016**, 16, 3374–3381.
3. S. Kim, AW Wark and HJ Lee, Anal. Chem. **2016**, *88*, 7793–7799.
4. J. Leckie, A. Hope, M. Hughes, S. Debnath, S. Fleming, A. W. Wark, R. V. Ulijn, M. D. Haw, *ACS Nano* **2014**, *8*, 9580–9589.
5. A. McLintock, H. J. Lee and A. W. Wark, *Phys. Chem. Chem. Phys.* **2013**, *15*, 18835–18843.
6. M. J. Kwon, J. Lee, A. W. Wark and H. J. Lee, *Anal. Chem.* **2012**, *84*, 1702–1707.

Catalysis and Synthesis

Academic Staff and Research Interests

Research in the Catalysis and Synthesis section encompasses a broad spectrum of interests from fundamental concepts in mechanistic chemistry to the application of new technology in projects of commercial and technological relevance. In addition, a significant skill set in physical organic chemistry allows us to develop our science at the highest level. Our specific skills lie in synthesis, methodology development, main group chemistry, organometallic chemistry, total synthesis, medicinal chemistry, green chemistry, physical organic chemistry, X-ray crystallography and NMR spectroscopy.

For further information, please visit: https://www.strath.ac.uk/research/subjects/chemistry/synthesiscatalysis/

Staff Members	*Research Interests*
Professor Eva Hevia	*Organometallic chemistry, catalysis, green chemistry, organic synthesis, s-block metals, multicomponent reagents.*
Dr Alan R. Kennedy	*Crystallography, structure-property relationships, s-block metals, solid-state pharmaceutical materials, colourants..*
Professor William J. Kerr	*Asymmetric synthesis, catalysis, organometallic chemistry, isotopic labelling, total synthesis.*
Professor Robert E. Mulvey	*Main group chemistry, organometallic chemistry, structure and bonding, synergic synthesis, catalysis.*
Professor John A. Murphy	*Physical organic chemistry, radical chemistry, single-electron donors.*
Dr David J. Nelson	*Catalysis, cross-coupling, organometallic chemistry, physical organic chemistry.*
Dr Charles T. O'Hara	*Main group chemistry, metallation, chiral ligands, organometallic, metal amides.*
Dr Stuart D. Robertson	*Organometallic chemistry, main group chemistry, earth abundant metals, energy storage.*

Professor Eva Hevia

Contact Details

Phone: +44 (0)141 548 3537; Email: eva.hevia@strath.ac.uk
http://www.evaheviagroup.com/
Orchid ID: 0000-0002-3998-7506

Career Synopsis

- 2013 – present: Professor, University of Strathclyde,
- 2011 – 2013: Reader, University of Strathclyde.
- 2010 – 2011: Senior Lecturer, University of Strathclyde
- 2006 – 2010: Lecturer, University of Strathclyde
- 2006 – 2014: Royal Society University Research Fellow, University of Strathclyde

Research Interests

Organometallic chemistry, catalysis, green chemistry, organic synthesis, s-block metals, multicomponent reagents

The Hevia group researches in the area of polar organometallic chemistry. Core tools of synthetic chemistry, polar organometallic reagents (typified by organolithium and Grignard reagents) are used worldwide for constructing compounds, especially aromatic compounds, which are ubiquitous in organic chemistry and thus in numerous commodities essential to everyday life. Hevia's rigorous studies have led to the design of polar mixed-metal reagents imbued with synergistic effects that display chemical properties and reactivity profiles far exceeding the limits of traditional single-metal reagents. These studies have improved existing or established new fundamentally important, synthetic methodologies based on either stoichiometric or catalytic reactions. Bimetallic synergistic effects have been demonstrated in an impressive array of important bond forming reactions spanning bimetallic catalysis, deprotonative metallation, main group metal-mediated small molecule activation, Green chemistry, and salt-induced activation. This core research represents a major step towards a paradigm shift in the practice and future scope of polar organometallic chemistry

Selected Publications

1. A. Hernán-Gómez, S. A. Orr, M. Uzelac, A. R. Kennedy, S. Barroso, X. Jusseau, S. Lemaire, V. Farina, E. Hevia, *Angew. Chem. Int. Ed.* **2018**, *57*, 10630.
2. L. C. H. Maddock, T. Nixon, A. R. Kennedy, M. R. Probert, W. Clegg, E. Hevia, *Angew. Chem. Int. Ed.* **2018**, *57*, 187.
3. A. Hernán-Gómez, A. R. Kennedy, E. Hevia, *Angew. Chem. Int. Ed.* **2017**, *56*, 6632.
4. R. McLellan, M. Uzelac, A. R. Kennedy, E. Hevia, R. E. Mulvey, *Angew. Chem. Int. Ed.*, **2017**, 56, 9566
5. C. Vidal, J. García-Álvarez, A. Hernán-Gómez, A. R. Kennedy, E. Hevia, *Angew. Chem. Int. Ed.* **2016**, *55*, 16145.

Dr Alan R. Kennedy

Contact Details

Phone: +44 (0)141 548 2016; Email: a.r.kennedy@strath.ac.uk

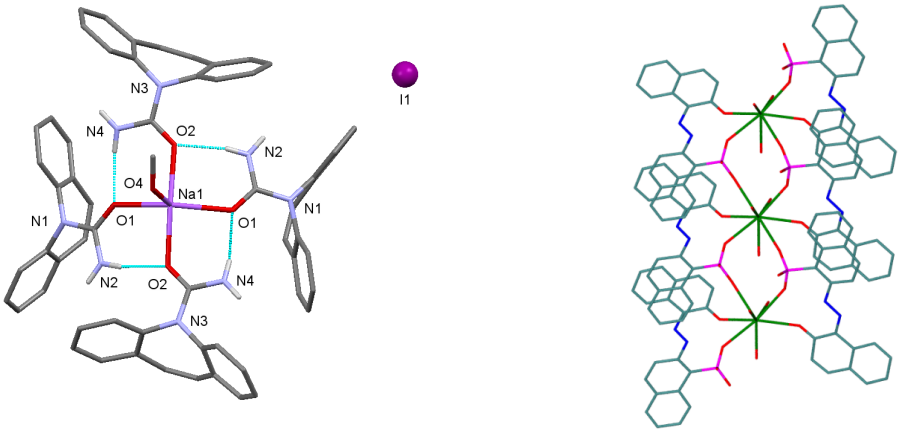
Career Synopsis

- 2011 – present: Reader, University of Strathclyde.
- 2006 – 2011: Senior Lecturer, University of Strathclyde.
- 2001 – 2006: Lecturer, University of Strathclyde.
- 1994 – 2001: Academic-Related Staff, University of Strathclyde.

Research Interests

Crystallography, Structure-Property Relationships, s-Block Metals, Solid-State Pharmaceutical Materials, Colourants.

I specialise in the technique of single crystal X-ray diffraction and in using the molecular and crystal structures determined by this to investigate relationships between structure and both chemical and physical properties. Such properties include the chemical reactivity of *s*-block organometallics, the bioavailability and process-ability of pharmaceuticals, the electrical conductivity of organic materials and the light fastness and colours of dyes and pigments.



Figures. Left; An ionic cocrystal form of the anti-epilepsy drug carbamazepine. Right; Part of the supramolecular structure of Lithol Red, a pigment used by the artist Rothko.

Personal webpages: http://www.strath.ac.uk/staff/kennedyalandr

Selected Publications

7. M. Warzecha, J. Calvo-Castro, A. R. Kennedy, A. Macpherson, K. Shankland, N. Shankland, A. J. McLean, C. J. McHugh, *Chem. Commun*., **2015**, *51*, 1143–1146.
8. A. J. Martinez-Martinez, A. R. Kennedy, R. E. Mulvey, C. T. O'Hara, *Science*, **2014**, *346*, 834–837.
9. A. R. Buist, A. R. Kennedy, *Cryst.Growth Des.,* **2014**, *14*, 6508–6513.
10. C. Vidal, J. Garcia-Alvarez, A. Hernan-Gomez, A. R. Kennedy, E. Hevia, *Angew. Chem.* **2014**, *53*, 5969–5973.

Professor William J. Kerr

Contact Details

Phone: +44 (0)141 548 2959; Email: w.kerr@strath.ac.uk

Career Synopsis

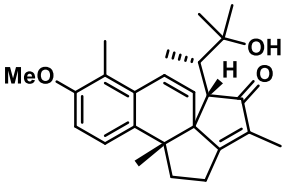
- 2014–present: Deputy Associate Principal (Research & Knowledge Exchange)
- 2011–present: 1919 Professor, University of Strathclyde
- 2002–2011: Professor in Organic Chemistry, University of Strathclyde
- 1997–2002: Senior Lecturer, University of Strathclyde
- 1989–1997: Lecturer, University of Strathclyde

Research Interests

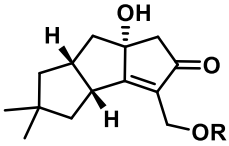
Asymmetric synthesis, catalysis, organometallic chemistry, isotopic labelling, total synthesis.

Organocobalt Chemistry

The group's focus here is the development of more applicable methods for facilitating the preparatively widely important Pauson-Khand reaction, as well as improved catalytic variants. This key cyclisation reaction has also been employed strategically in the synthesis of natural products, including (+)-taylorione and various members of the cedrene family. Current targets include Agariblazeispirol C and Xeromphalinones C and D.



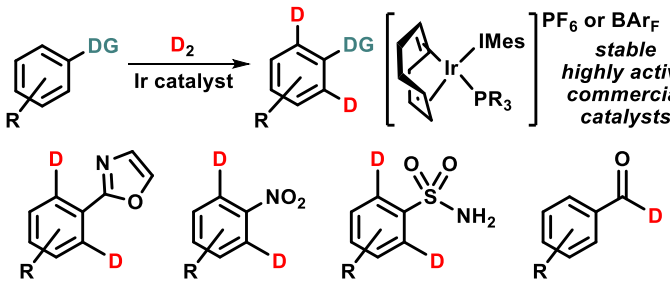
Agariblazeispirol C



Xeromphalinones C (R=H) and D (R=Me)

Organoiridium Chemistry

A suite of new Ir(I) complexes, designed and prepared by the Kerr group, display remarkable levels of reactivity and selectivity in hydrogen-isotope exchange reactions directed by a wide variety of functionality, including *N*-heterocycles, nitro, ester, amide, and sulfonamide groups. As a result of their superiority over previous catalysts, these complexes have now been commercialised. Current studies involve deepening the group's understanding of the mechanism of hydrogen isotope exchange, in addition to extending the utility of these complexes to new catalytic bond-forming processes and asymmetric catalysis.



http://www.strath.ac.uk/staff/universitymanagement/associatedeputyprincipalresearchampknowledgeexchangeprofessorwilliamkerr/

Selected Publications

1. W. J. Kerr, in *The Pauson-Khand Reaction: Scope, Variation and Applications*, R. R. Torres, Ed., Wiley: Chichester, **2012**, Chapter 1, pp 1–21.
2. J. A. Brown, A. R. Cochrane, S. Irvine, W. J. Kerr, B. Mondal, J. A. Parkinson, L. C. Paterson, M. Reid, T. Tuttle, S. Andersson, G. N. Nilsson, *Adv. Synth. Catal.* **2014**, *356*, 3551–3562.
3. W. J. Kerr, M. Reid, T. Tuttle, *ACS Catal.* **2015**, *5*, 402–410.
4. W. J. Kerr, M. Reid, T. Tutle, *Angew. Chem. Int. Ed.* **2017**, *56*, 7808-7812.

Professor Robert E. Mulvey

Contact Details

Phone: +44 (0)141 548 2093; Email: r.e.mulvey@strath.ac.uk

Career Synopsis

- 2016 – present: Deputy Head, University of Strathclyde
- 2011 – present: *1919* Professor, University of Strathclyde
- 1995 – 2011: Professor and Head of Inorganic Chemistry
- 1993 – 1995: Senior Lecturer, University of Strathclyde
- 1991 – 1993: Lecturer, University of Strathclyde
- 1986 – 1991: Royal Society University Fellow, University of Strathclyde

Research Interests

Main group chemistry, organometallics, cooperative bimetallics, homogeneous catalysis

Organolithium compounds have long been indispensable bond-making tools, used in synthetic laboratories worldwide, and increasingly employed from milligram to ton scales in fine chemical and pharmaceutical manufacture. Complementing this chemistry, we are developing a new field of *cooperative bimetallics*, where lithium, sodium or potassium facilitate special chemistry of less reactive metals such as magnesium, aluminium or zinc, that without the alkali metal would be impossible. This *alkali metal mediation* is currently advancing two areas:

Trans-Metal-Trapping Here bimetallic cooperativity converts low-yielding alkali-metal metalation reactions to high-yielding, with the more basic alkali-metal implementing the C-H to C-M transformation; while the other metal (e.g., Al, Fe, Ga, Mn, Fe) traps the emerging carbanion, enabling onward use in synthetic campaigns.

Hetero-Bimetallic Catalysis Seeking more sustainable, precious-transition-metal free, catalysts lithium aluminates are being prepared that possess Li–Al cooperativity for use in catalytic hydroboration and hydrophosphination applications. These ate catalysts, which can outperform neutral aluminium species due to the polarising effect of lithium, provide entry points into the future design of Al catalysts targeting substrate specific transformations.

Selected Publications

1. V. A. Pollard, M. Ángeles Fuentes, A. R. Kennedy, R. McLellan, R. E. Mulvey, *Angew. Chem. Int. Ed.,* **2018**, *57*, 10651–10655.
2. V. A. Pollard, S. A. Orr, R. McLellan, A. R. Kennedy, E. Hevia, R. E. Mulvey, *Chem.Commun.* **2018**, *54*, 1233–1236.
3. R. McLellan, A. R. Kennedy, S. A. Orr, S. D. Robertson, R. E. Mulvey, *Angew. Chem. Int. Ed.* **2017**, *56*, 1036–1041.
4. D. R. Armstrong, E. Crosbie, E. Hevia, R. E. Mulvey, D. L. Ramsay, S. D. Robertson, *Chem. Sci.* **2014**, *5*, 3031–3045.
5. A. J. Martinez-Martinez, A. R. Kennedy, R. E. Mulvey, C. T. O'Hara, *Science* **2014**, *346*, 834–837.
6. R. E. Mulvey, V. L. Blair, W. Clegg, A. R. Kennedy, J. Klett, L. Russo, *Nature Chemistry*, **2010**, *2*, 588–591.

Professor John A. Murphy

Contact Details

Phone: +44 (0)141 548 2389; Email: john.murphy@strath.ac.uk
Website: www.johnmurphygroup.com

Career Synopsis

- 1995–present: Merck-Pauson Professor, University of Strathclyde.
- 1983–1995: Lecturer then Reader, University of Nottingham.

Awards and Prizes:

- RSC Charles Rees award 2016 (http://www.rsc.org/ScienceAndTechnology/Awards/CharlesReesAward/2016-Winner.asp)
- RSC Bader award 2012 (http://www.rsc.org/ScienceAndTechnology/Awards/BaderAward/2012-Winner.asp)

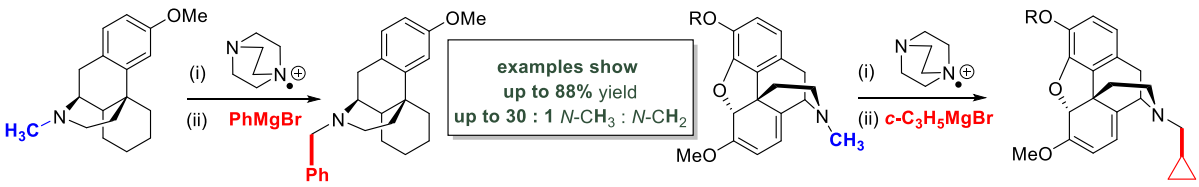
Research Interests

Discovering new reactions, organic reactivity and mechanism, radical chemistry, electron transfer reactions, physical organic chemistry.

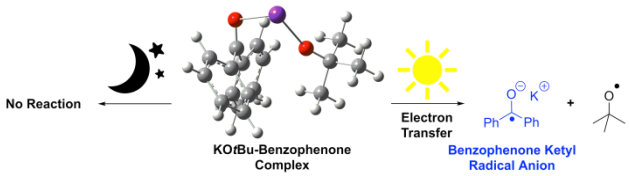
My group's research interests are in the reactivity of molecules and their uses in chemistry and in biology.

Example 1: Transition metal-free site selective C-H functionalisation.[4]

Exquisitely selective single-pot functionalisation of N-Me groups in trialkylamines with organometallics



Example 2: Visible light causes electron transfer from KO*t*Bu (but not NaO*t*Bu) to benzophenone.[1]



Selected Publications

1. G. Nocera, A. Young, F. Palumbo, K. Emery, G. Coulthard, T. McGuire, T. Tuttle and J. A. Murphy, *J. Am. Chem. Soc*. **2018**, *140*, 9751−9757. DOI: 10.1021/jacs.8b06089.

2. J. P. Barham, S. E. Dalton, M. Allison, G. Nocera, A. Young, M. P. John, T. McGuire, S. Campos, T. Tuttle and J. A. Murphy, *J. Am. Chem. Soc*. **2018**, *140*, 11510–11518. DOI:10.1021/jacs.8b07632.

3. A. J. Smith, A. Young, S. Rohrbach, E. F. O'Connor, M. Allison, H.-S. Wang, D. L. Poole, T. Tuttle and J. A. Murphy, *Angew. Chem. Int. Ed.* **2017**, *56*, 13747–13751. DOI: 10.1002/anie.201707914.

4. J. P. Barham, M. P. John and J. A. Murphy, *J. Am. Chem. Soc.* **2016**, *138*, 15482−15487. DOI: 10.1021/jacs.6b09690.

Dr David J. Nelson

Contact Details

Phone: +44 (0)141 548 4383; Email: david.nelson@strath.ac.uk

Career Synopsis

- 2014–present: Chancellor's Fellow and Lecturer, University of Strathclyde
- 2012–2014: Research Fellow, University of St Andrews
- 2008–2012: PhD, University of Strathclyde

ORCID: 0000-0002-9461-5182

Research Interests

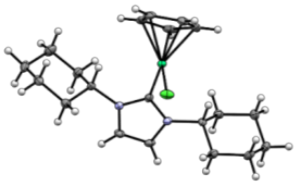
Homogeneous catalysis, organometallic chemistry, physical organic chemistry, organic synthesis

We study homogenous catalysis for organic synthesis, using the tools of organometallic, organic synthetic, and physical organic chemistry; we have a particular focus on understanding and quantifying reactivity and selectivity so that synthetic methods can be used with confidence in academic and industrial laboratories. Our research projects cover three broad themes:

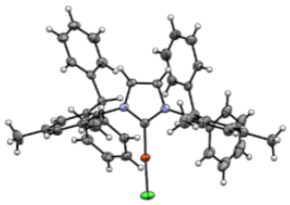
Nickel Catalysis. Nickel catalysis can allow us to use new feedstocks and rapidly access important molecules. We study fundamental steps using computational[1] and experimental methods,[2] and focus on quantitative studies of reactivity and selectivity. We design and study new catalysts.[3,4]

Catalytic C-H functionalisation. C-H activation regioselectivity can be enforced using directing groups, but this has not been widely tested in densely functionalised molecules. We are constructing a quantitative scale of directing ability of a range of widely-used directing groups.

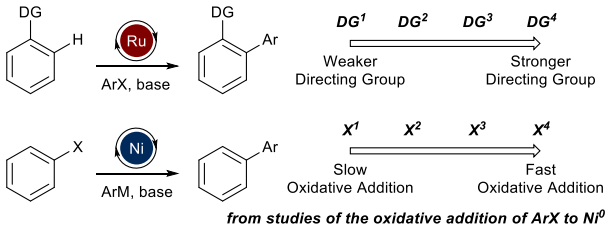
Ligand design. The choice of ligand for a transition metal often makes the difference between the success or failure of a synthetic reaction. We explore and quantify ligand properties,[5] particularly those of *N*-heterocyclic carbenes, and design new ligands with specific electronic and steric properties.[3,4]



New Catalysts



New Ligands



Understanding/Quantifying Reactivity

For further information and a full publication list, please visit: http://personal.strath.ac.uk/david.nelson/

Selected Publications

1. D. J. Nelson, I. Funes Ardoiz and F. Maseras, *Submitted*
2. S. Bajo Velazquez, G. Laidlaw, S. Sproules, A. R. Kennedy and D. J. Nelson, *Submitted*
3. J. Yau, K. E. Hunt, L. McDougall, A. R. Kennedy and D. J. Nelson, *Beilstein J. Org. Chem.*, 2015, **11**, 2171-2178
4. P. Shaw, A. R. Kennedy and D. J. Nelson, *Dalton Trans.* 2016, **45**, 11772-11780.
5. S. V. C. Vummaleti, D. J. Nelson, A. Poater, A. Gómez-Suaréz, D. B. Cordes, A. M. Z. Slawin, S. P. Nolan, L. Cavallo, *Chem. Sci.* **2015**, *6*, 1895–1904

Dr Charles T. O'Hara

Contact Details

Phone: +44 (0)141 548 2667; Email: charlie.ohara@strath.ac.uk

Career Synopsis

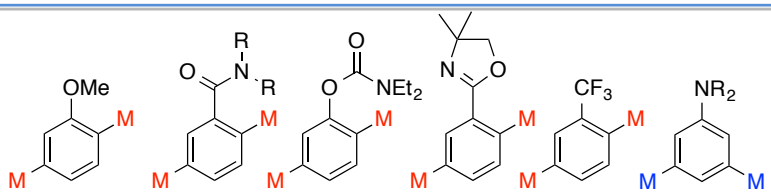
- 2011 – present: Senior Lecturer in Inorganic Chemistry and EPSRC Career Acceleration Fellow, University of Strathclyde
- 2006 – 2011: Lecturer in Inorganic Chemistry, University of Strathclyde
- 2005 – 2006: PDRA, University of Bath

Research Interests

Keywords: main group; metallation; chiral ligands; organometallic; metal amides

We are interested in using s-block organometallic chemistry to enhance or achieve new methodologies that can be employed in organic synthesis. By combining a Group 1 organometallic reagent with a Group 2 one, a structural chemistry unique to the bimetallic reagent can be achieved. As structure is inherently linked to reactivity, the bimetallics often offer an unprecedented synthetic chemistry.

We have recently shown that certain sodium/magnesium organometallics can be used to carry out hitherto unobtainable organic transformations, namely converting simple monosubstituted arenes to trisubstituted arenes in a one pot, regioselective manner.[1-2]



M = Mg-NR_2. These organometallic intermediates can readily be converted to the respective organic molecules by treatment with appropriate electrophiles.

We are also interested in the synthesis and characterisation of chiral variants of bimetallic reagents and their utilisation in asymmetric synthesis,[3-4] as well as the coordination chemistry of alkali metal amide species.[5-6]

Personal webpage: www.oharalab.com
ORCID ID: 0000-0002-1691-1568

Selected Publications

1. A. J. Martínez-Martínez, A. R. Kennedy, R. E. Mulvey, C. T. O'Hara, *Science* **2014**, *346*, 834–837; A. J. Martínez-Martínez, S. Justice, B. J. Fleming, A. R. Kennedy, I. D. H. Oswald, C. T. O'Hara, *Science Advances* **2017**, *3*, e1700832.
2. A. J. Martínez-Martínez, D. R. Armstrong, B. Conway, B. J. Fleming, J. Klett, A. R. Kennedy, R. E. Mulvey, S. D. Robertson, C. T. O'Hara, *Chem. Sci.* **2014**, *5*, 771–781.
3. J. Francos, S. Zaragoza-Calero, C. T. O'Hara, *Dalton Trans.*, **2014**, *43*, 1408–1412.
4. J. Francos, P. C. Gros, A. R. Kennedy, C. T. O'Hara, *Organometallics* **2015**, *34*, 2550–2557.
5. A. R. Kennedy, R. E. Mulvey, C. T. O'Hara, G. M. Robertson, S. D. Robertson, *Angew. Chem. Int. Ed.* **2011**, *50*, 8375–8378.
6. A. I. Ojeda-Amador, A. J. Martínez-Martínez, A. R. Kennedy, D. R. Armstrong, C. T. O'Hara, *Chem. Commun.*, **2017**, *53*, 324-327.

Dr Stuart D. Robertson

Contact Details

Phone: +44 (0)141 548 2642; Email: stuart.d.robertson@strath.ac.uk

Career Synopsis

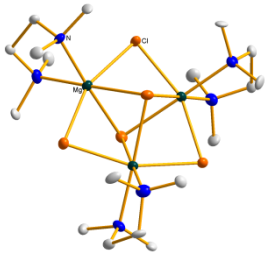
- 2016 – present: Chancellor's Fellow, University of Strathclyde
- 2012 – 2017: Royal Society of Edinburgh BP Trust Fellow, University of Strathclyde
- 2009 – 2012: Research Fellow, University of Strathclyde
- 2006 – 2009: Research Fellow, University of Calgary
- 2002 – 2006: PhD, University of St Andrews

Research Interests

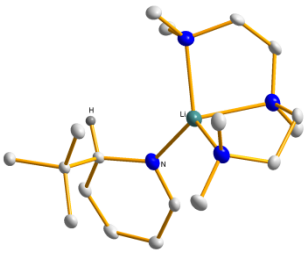
Organometallic chemistry, main group chemistry, earth abundant metals, energy storage.

We are interested in the chemistry of the earth abundant main group metals, and how their homo- and heterometallic complexes can be manipulated and exploited. Our focus is on lightweight, relatively cheap and environmentally friendly metals of high natural abundance, with a particular focus on practical applications of this chemistry in areas such as energy storage, catalysis and synthesis.

1. Magnesium aluminates as potential rechargeable battery electrolytes. This program involves the development of a rational and repeatable high-yielding methodology for the synthesis of Magnesium aluminates complexes of general formula $[Mg_xCl_y]^+$ $[(R_2N)AlCl_3]^-$, with control over the aggregation state of the cation dictated by judicious choice of solvating Lewis donor co-ligands. An understanding of their solution and solid-state behaviour is key to their use as electrolytes in rechargeable batteries.



2. Dihydropyridyl complexes as hydrocarbon soluble sources of metal hydrides. We have developed a synthetic protocol for the synthesis and stabilisation of sensitive metallo-1,2-dihydropyridyl complexes, which can be considered as surrogate metal hydride complexes which can display increased solubility, even in non-polar solvents such as hexane. Their practical usages as efficient hydrometallating (reducing) agents and in catalysis are currently being explored.



Selected Publications

1. R. McLellan, A.R. Kennedy, R.E. Mulvey, S.A. Orr and S.D. Robertson, *Chem. Eur. J.*, **2017**, *23*, 16823-16861.
2. R. McLellan, A.R. Kennedy, S.A. Orr, S.D. Robertson and R.E. Mulvey, *Angew. Chem. Int. Ed.*, **2017**, *56*, 1036-1041.
3. E.V. Brouillet, A.R. Kennedy, K. Koszinowski, R. McLellan, R.E. Mulvey and S.D. Robertson, *Dalton Trans.*, **2016**, *45*, 6234-6240.
4. S. D. Robertson, A. R. Kennedy, J. J. Liggat, R. E. Mulvey, *Chem. Commun.* **2015**, *51*, 5452–5455.
5. R. E. Mulvey, S. D. Robertson, *Angew. Chem. Int. Ed.* **2013**, *52*, 11470-11487.

ChemBio and MedChem

Academic Staff and Research Interests

Research in chemical biology and medicinal chemistry encompasses a broad spectrum of interests from the delivery of chemical tools to underpin and advance basic biology to the application of knowledge in drug discovery.

Our specific skills lie in synthesis, bioinformatics, nucleic acid chemistry, amino acid chemistry, heterocyclic chemistry, biophysical chemistry and NMR spectroscopy.

For further information, please visit:
https://www.strath.ac.uk/research/subjects/chemistry/chemicalbiologymedicinalchemistry/

Staff Members	*Research Interests*
Prof Glenn A. Burley	*Alternative splicing therapies, bioconjugation, chemistry of nucleosides, gene expression, nucleic acid chemical biology.*
Dr Mark J. Dufton	*Bioinformatics, biomolecular structure and mechanism, drug discovery*
Dr Craig Jamieson	*Catalysis, chemical biology, drug discovery, medicinal chemistry, organic synthesis.*
Dr Barry D. Moore	Biophysical chemistry, non-aqueous biocatalysis, self-assembly, mechanisms of crystal formation, PCMC, CaP-PCMC, formulation of therapeutic proteins and vaccines.
Dr John A. Parkinson	Solution phase NMR, experimental NMR methods, NMR instrumentation, NMR data handling and interpretation.
Professor Colin J. Suckling	Drug discovery, medicinal chemistry, heterocycle synthesis.
Professor Nick C. O. Tomkinson	*Catalysis, chemical biology, medicinal chemistry, organic synthesis.*

Dr Glenn A. Burley

Contact Details

Phone: +44 (0)141 548 2792; Email: glenn.burley@strath.ac.uk

Career Synopsis

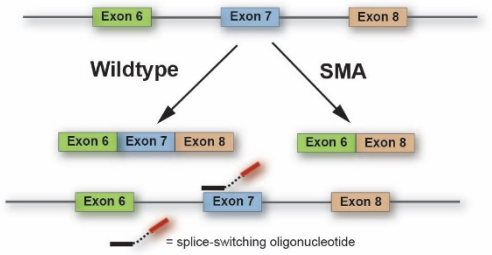
- 2011–present: Senior Lecturer, University of Strathclyde
- 2007–2011: Lecturer & EPSRC Advanced Research Fellow, University of Leicester
- 2004–2006: Alexander von Humboldt Research Fellow, Ludwigs Maximilians University (LMU), Munich, Germany
- 2001–2003: EPSRC Research Fellow, University of Sussex

Research Interests

Alternative splicing therapies, bioconjugation, chemistry of nucleosides, gene expression, nucleic acid chemical biology.

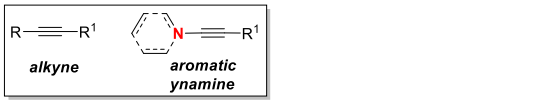
Our research is focused on understanding and controlling gene expression. We use a multi-disciplinary approach that blends Synthetic Organic Chemistry, Biochemistry, and Bio-Engineering to create molecules and platform technologies that are used to investigate the mechanisms of transcription and alternative RNA splicing. Three nodes of research are currently being pursued:

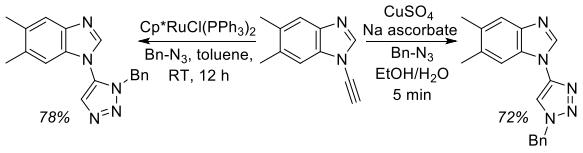
1. Chemical Biology of Alternative RNA Splicing. This research programme aims to unravel the fundamental issues associated with splice site selection to design new therapies for the treatment of diseases associated with aberrant splicing pathways such as Spinal Muscular Atrophy and Cancer.[1]



2. Programmable DNA-binding molecules as transcriptional modulators. This Chemical Biology programme aims to down-regulate the expression of genes by disrupting the binding of transcription factors to their target promoter sequences with minor groove binders.[2]

3. Aromatic Ynamine Chemistry. New synthetic methodology is being developed to explore the wider utility of aromatic ynamines as a new generation of highly chemoselective synthons for bioconjugation and biosensing applications.[3]





For further information, please visit: www.burleylabs.co.uk

Selected Publications

1. (a) L. D. Smith, R. L. Dickinson, C. M. Lucas, A. Cousins, A. A. Malygin, C. Weldon, A. J. Perrett, A. R. Bottrill, M. S. Searle, G. A. Burley, I. C. Eperon, *Cell Reports* **2014**, *9*, 193–205; (b) H. Lewis, A. J. Perrett, G. A. Burley, I. C. Eperon, *Angew. Chem. Int. Ed.* **2012**, *51*, 9800–9803.
2. (a) I. Singh, C. Wendeln, A. W. Clark, J. M. Cooper, B. J. Ravoo, G. A. Burley, *J. Am. Chem. Soc.* **2013**, *135*, 3449–3457; (b) W. Su, M. Schuster, C. R. Bagshaw, U. Rant, G. A. Burley, *Angew. Chem. Int. Ed.* **2011**, *50*, 2712–2715.
3. G. A. Burley, D. L. Davies, G. A. Griffith, M. Lee, K. Singh, *J. Org. Chem.* **2010**, *75*, 980–983.

Dr Mark J. Dufton

Contact Details

Phone: +44 (0)141 548 2440; Email: mark.dufton@strath.ac.uk

Career Synopsis

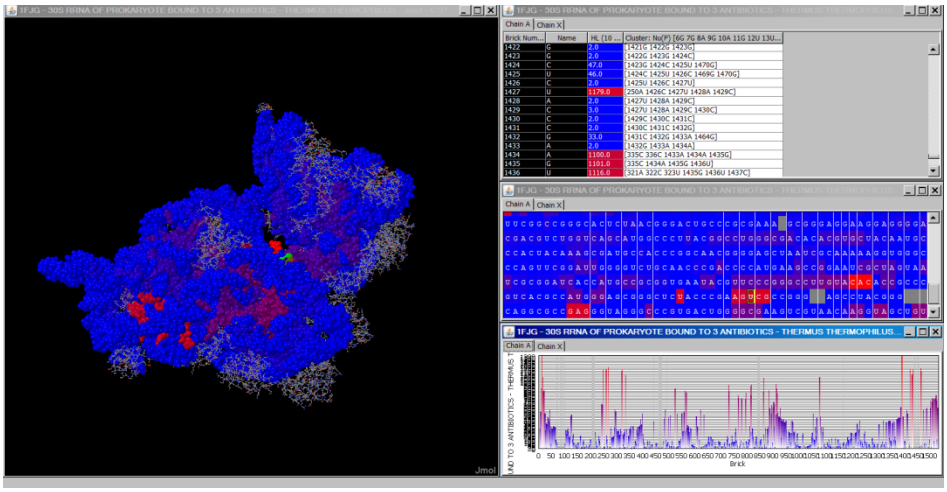
- 2001–present: Academic Selector, University of Strathclyde
- 1994–present: Senior Lecturer, University of Strathclyde
- 1984–1994: Lecturer, University of Strathclyde
- 1982–1984: Senior Research Officer, University of Essex
- 1982: Research Fellow, University of Marseilles

Research Interests

Bioinformatics, biomolecular structure and mechanism, drug discovery.

Specialist area: Bioinformatics and Drug discovery, in collaboration with Computer & information Science at Strathclyde

Computer analysis of biomolecule structural data (nucleic acids and proteins) permits the prediction of drug binding sites and molecules that could act as drugs. Such techniques can reduce the cost of drug discovery and lead to smarter drug action. Unique software has been developed that can analyse the 3D structures of RNA and proteins to predict sites in the molecules where a drug could bind and induce an allosteric change. This software is confidentially available to users on a commercial basis. Methods to automate the interpretation of real time NMR data are also under development.

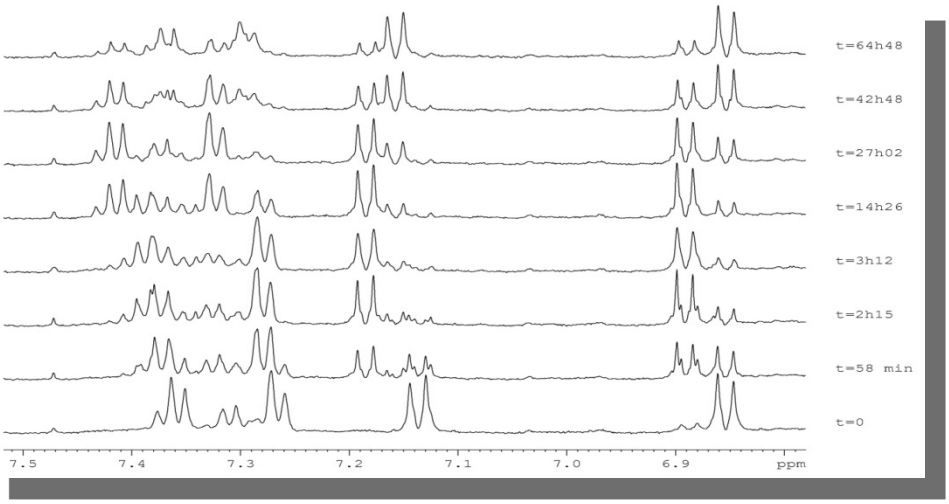


Screenshot of software for prediction of allosteric sites in ribosomal RNA

Specialist area: Natural Venoms and Drug Discovery, in collaboration with Strathclyde Institute for Pharmacy & Biomedical Science

Venoms from insects and snakes contain many pharmacologically active ingredients, some of which hold great promise for drug discovery. Original research via such techniques as real time NMR, synthesis and immunological assays are establishing the chemical detail and physiological impact of the local and systemic events that immediately follow envenomation. Potential applications range from anti-aging cosmetics through to pain control and highly selective tissue destruction.

Progress of cobra venom enzyme action as revealed by real time NMR



For further information, please visit: www.strath.ac.uk/chemistry/staff/academic/markdufton/

Recent Publications

1. A. Alqarni, V. Ferro, J. Parkinson, M. Dufton, D. Watson **2018** *Vaccines* 6, 72

2. S. Alonezi, J. Tusiimire, J. Wallace, M.Dufton, J. Parkinson, L. Young, C. Clements, J. Park, J. Jeon, V. Ferro, D. Watson *Metabolites* **2017**, 7, 14

3. S. Alonezi, J. Tusiimire, J. Wallace, M. Dufton, J. Parkinson, L. Young, C. Clements, J. Park, J. Jeon, V. Ferro, D. Watson *Metabolites* **2016**, 6, 35

4. J. Tusiimire, J. Wallace, N. Woods, M. Dufton, J.Parkinson, G. Abbott, C. Clements, L. Young, J. Park, J. Jeon, V. Ferro, D. Watson *Vaccines* **2016**, 4, 11

5. J. Tusiimire, J. Wallace, M. Dufton, J. Parkinson, C. J. Clements, L. Young, J. K. Park, J. W. Jeon, D. G. Watson, *Anal. Bioanal. Chem.* **2015**, *407*, 3627–3635.

Dr Craig Jamieson

Contact Details

Phone: +44 (0)141 548 4830; Email: craig.jamieson@strath.ac.uk

Career Synopsis

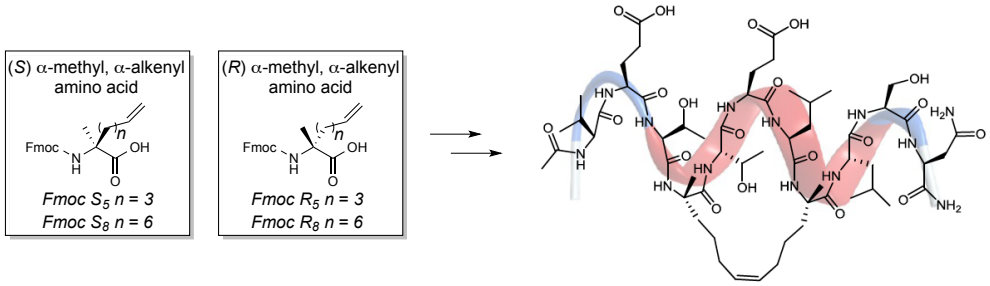
- 2015–present: Senior Lecturer, University of Strathclyde
- 2010–2015: Lecturer, University of Strathclyde
- 2004–2010: Group Leader, Medicinal Chemistry, Merck & Co
- 2000–2004: Principal Scientist, Discovery Research, GlaxoSmithKline
- 1999–2000: Postdoctoral Research Associate, University of Cambridge

Research Interests

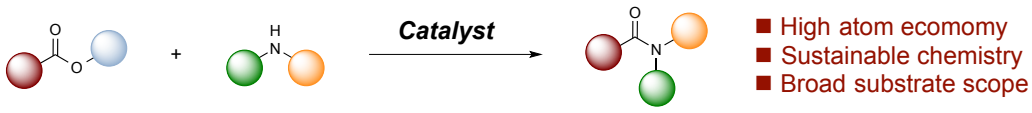
Drug discovery, medicinal chemistry, chemical biology, catalysis, organic synthesis.

Hit and Lead identification for disease relevant targets
Hit to lead and lead to candidate optimisation continue to be strong themes in the group. Current targets include development of novel ion channel modulators for the Alzheimer's therapy area, as well as identification of new leads of potential utility in Fibrosis and Oncology.

Provision of tools to validate challenging biological targets
We have a long-standing interest in the Ubiquitin-Proteasome System. In this area, we use the technique of Peptide Stapling to prepare tool molecules which can be used to interrogate the relevance of this pathway in diseases of societal need (*e.g.*, Alzheimer's).



Enabling synthetic methodology for medicinal chemistry
A major focus has been on development of sustainable amide bond forming reactions using unactivated ester derivatives. Other areas of interest include Pd-mediated amidation processes and development of methods for the synthesis of chiral heterocycles of pharmaceutical relevance.



For further information, please visit: www.strath.ac.uk/chemistry/staff/academic/craigjamieson/

Selected Publications

1. N. Caldwell, J. E. Harms, K. M. Partin, C. Jamieson, *ACS Med. Chem. Lett.* **2015**, *6*, 392–396.
2. N. Caldwell, C. Jamieson, I. Simpson, A. J. B. Watson, *Chem. Commun.* **2015**, *51*, 9495–9498.
3. S. M. Bertrand, C. Jamieson *et al*, *J. Med. Chem.* **2015**, *58*, 7140–7163.
4. C. G. McPherson, K. Livingstone, C. Jamieson, I. Simpson, *Synlett,* **2016**, *27*, 88–92.
5. N. D. Measom, C. Jamieson *et al*, *ACS Med. Chem. Lett.* **2017**, DOI: 10.1021/acsmedchemlett.6b00281
6. L. M. Miller, C. Jamieson, A. J. B. Watson *et al*, *J. Med. Chem.* **2017**, *8*, 43–48.

Dr Barry D. Moore

Contact Details

Phone: +44 (0)141 548 2458; Email: b.d.moore@strath.ac.uk

Career Synopsis

- 2006 – R&D Director, Industrial Fellow, XstalBio Ltd
- 2002 – Reader in Biophysical Chemistry, University of Strathclyde
- 1997-2002 Senior Lecturer Biophysical Chemistry, University of Strathclyde
- 1990-1997 Lecturer, Molecular Electronics, University of Strathclyde

Research Interests

Biophysical chemistry, non-aqueous biocatalysis, self-assembly, mechanisms of crystal formation, PCMC, CaP-PCMC, formulation of therapeutic proteins and vaccines,

Specialist Area: Formulation of therapeutic proteins and vaccines
A significant proportion of new medicines under development are based on therapeutic proteins and vaccines. I work on ways of formulating biologic drugs so they can be administered to patients safely and more conveniently. Targets include improvements to stability, sustained and controlled release methods and alternatives to injection or infusion for drug delivery. The aim is to encourage better patient compliance, enhance drug efficacy and lower health-care costs. I have a particular interest in next generation sub-unit vaccines and work on novel microparticle formulations with tuneable immunogenic properties and very high stability so they can be shipped and stored without a cold-chain.

Specialist Area: Self-assembly and mechanisms of crystal formation
Self-assembly is how ordered and often intricate structures spontaneously arise from complex disordered molecular mixtures. I have explored a number of systems that exhibit this type of behaviour and tried to identify the mechanisms underlying them. This work has helped to show that even self-assembly of simple molecular crystals can be more complex than was previously thought.

Specialist Area: Non-aqueous biocatalysis
I have had a long-term interest in development of technologies that can be used to improve the performance of enzymes when they are used as catalysts in non-natural applications, particularly unde low water conditions. This work has led to development of better ways of preparing immobilised biocatalysts, tools for controlling the enzyme microenvironment including hydration and protonation states and techniques for characterising structural changes in the solid-state.

Selected Publications

1. M. Kreiner, B.D. Moore, M.C. Parker, *Chem. Commun*. **2001**, 1096-1097.
2. S. Jones, C. Asokanathan, D. Kmiec, J. Irvine, R. Fleck, D. Xing, B. Moore, R. Parton, J. Coote, *Vaccine* **2013**, *32*, 4234-4242.
3. B.D. Moore, L. Stevenson, A. Watt, S. Flitsch, N.J. Turner, C. Cassidy, D. Graham, *Nat. Biotechnol.*, **2004**, *22*, 1133-1138.
4. A. Jawor-Baczynska, J. Sefcik, B. D. Moore, *Cryst Growth Des*. **2013**, 13, 470-478.
5. A. Ganesan, N.C. Price, S.M. Kelly, I. Petry, B.D. Moore, P.J. Halling, *Biochim. Biophys. Acta.* **2006**, *1764*, 1119-1125.

Dr. John A. Parkinson

Contact Details

Phone: +44 (0)141 548 2820; Email: john.parkinson@strath.ac.uk

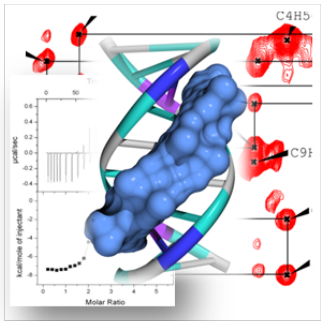
Career Synopsis

- 2013-present: Senior Research Fellow, University of Strathclyde
- 2001–present: NMR Spectroscopist, University of Strathclyde
- 1990–2001: NMR Spectroscopist, National Ultra-High Field NMR Facility and Metals in Medicine Group, University of Edinburgh
- 1988–1989: Postdoctoral Research Associate, University of Manchester

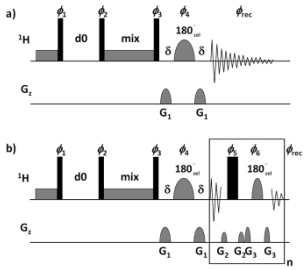
Research Interests

NMR spectroscopy.

John is a career-track applications specialist in the field of solution phase nuclear magnetic resonance (NMR) spectroscopy. His diverse interests lie in the fields of (bio)molecular recognition and reactivity, molecular self-assembly, metabolic profiling, monitoring, studies of small molecule structure and dynamics and of NMR diffusometry, pureshift and related methods for understanding complex mixtures to complex structures. A central theme running John's work is the study of the structures and behaviours of nucleic acid/ligand complexes in partnership with research groups at Strathclyde (Suckling, Burley) developing new DNA minor-groove binding molecules with antibiotic or bioanalytical activity. These studies are supported by molecular modelling, data modelling, isothermal titration calorimetry (ITC) and related methods. Biomolecular NMR studies have extended in recent years to the investigation of enzyme reaction systems in the context of whole venom from bees, snakes and other venomous species in partnership with Mark Dufton (Pure and Applied Chemistry) and David Watson (Strathclyde Institute for Pharmaceutical and Biomedical Science).



Structure & Thermodynamics of DNA / ligand recognition (Ref 1.)



Selective- & HOBS-NOESY for DNA studies (Ref 2.)

For further information, please visit: http://www.strath.ac.uk/staff/parkinsonjohndr

Selected Publications

1. H. Y. Alniss, M.-V. Salvia, M. Sadikov, I. Golovchenko, N. G. Anthony, A. I. Khalaf, S. P. MacKay, C. J. Suckling, J. A. Parkinson, *ChemBioChem* **2014**, *15*, 1978–1990.
2. J. M. McKenna, J. A. Parkinson, *Magn. Reson. Chem.* **2015**, *53*, 249–255.
3. M. A. Rubinson, J. A. Parkinson, M. P. Evstigneev, *Chem. Phys. Lett.* **2015**, *624*, 12–14.
4. J. Tusiimire, J. Wallace, M. J. Dufton, J. A. Parkinson, C. J. Clements, L. Young, J. Park, J. W. Jeon, D. G. Watson, *Anal. Bioanal. Chem.* **2015**, *407*, 3627–3635.
5. A. A. H. Santiago, A. S. Buchelnikov, M. A. Rubinson, S. O. Yesylevskyy, J. A. Parkinson, M. P. Evstigneev, *J. Chem. Phys.* **2015**, *142*, 1–12.
6. G. Padroni, J. A. Parkinson, K. Fox, G. A. Burley *Nuc. Acids Res.* **2018**, *46(1),* 42-53
7. J. A. Parkinson, 'NMR Spectroscopy Methods in Metabolic Phenotyping' in *The Handbook of Metabolic Phenotyping* J. K. Nicholson, J. C. Lindon, E. Holmes (eds). **2019**, Elsevier, Amsterdam, The Netherlands.

Prof Colin J Suckling

Contact Details

Phone: +44 (0)141 548 2671; Email: c.j.suckling@strath.ac.uk

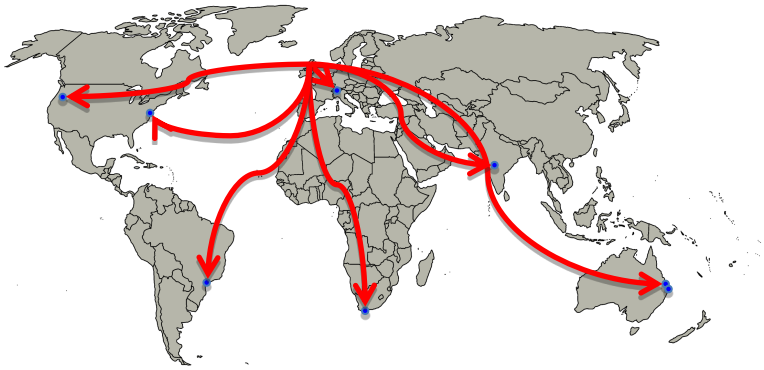
Career Synopsis

- 1992 – 2004: successive roles in senior University management (Dean, Vice Principal) mixed with continuous teaching and research.
- 1990 – 2012: Freeland Professor of Chemistry
- 2012 – present: Research Professor

Research Interests

Research centres on the synthesis and properties of heterocyclic compounds designed as molecular probes for biological systems or as drugs, for treating infectious diseases and diseases of imbalance. We have a worldwide network of collaborators for the evaluation and development of our compounds.

World wide network of collaborations for Strathclyde compounds.
Locations of principal collaborators outside the UK are shown.



The most advanced antibacterial compound is about to enter a Phase 2 clinical trial for the treatment of *Clostridium difficile* infections developed through our commercial partner, MGB Biopharma. The active compound belongs to a class known as DNA minor groove binders (MGBs) which work by interacting with DNA to modify its function in a cell. By appropriately varying the structure we are able to obtain different MGBs that have the potential to be developed as drugs for treating tuberculosis, sleeping sickness, and some forms of cancer, for example [1,2]. Of these, compounds active against African Animal Trypanosomiasis show great promise (with the University of Glasgow). We have strong candidates for the treatment of fungal infections (with the University of Manchester).

Drugs to treat diseases of imbalance such as inflammatory diseases are also under investigation [3]. Proof of concept studies in mouse models of diseases such as asthma, lupus erthrythrematosus, lung fibrosis, and rheumatoid arthritis have all been successful. Mechanism of action studies are of great interest and so far have shown that the compounds modulate the target cell's cytokine release response by binding to specific proteins.

Current studies in all fields seek improved active compounds and a clearer understanding of their mechanism of action.

Selected Publications

1. F.J. Scott, M. Puig-Sellart, A.I. Khalaf, C.J. Henderson, G. Westrop, D.G. Watson, K. Carter, H.M. Grant, C.J. Suckling. *Bioorg. Med. Chem. Lett.* **2016**, *26*, 3478-3486.
2. F.J. Scott, A.I. Khalaf, F. Giordani, P.E. Wong, S. Duffy, M.P. Barrett, V.M. Avery, C.J. Suckling, *Eur. J. Med. Chem*. **2016**, 116, 116-125
3. L. Al-Riyami, M.A. Pineda, J. Rzepecka, J.K. Huggan, A.I. Khalaf, C.J. Suckling, F.J. Scott, D.T. Rodgers, M.M. Harnett, and W. Harnett. *J. Med. Chem.* **2013**, *56*, 9982-10002.

Professor Nick C. O. Tomkinson

Contact Details

Phone: +44 (0)141 548 2276; Email: nicholas.tomkinson@strath.ac.uk

Career Synopsis

- 2011–present: Professor, University of Strathclyde, UK
- 2009–2011: Senior Lecturer, Cardiff University, UK
- 2004–2009: EPSRC Advanced Research Fellow, Cardiff University, UK
- 1999–2004: Lecturer, Cardiff University, UK
- 1996–1998: Postdoctoral Research Fellow, GlaxoSmithKline, USA

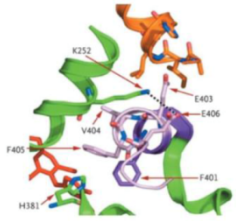
Research Interests

Catalysis, chemical biology, medicinal chemistry, organic synthesis.

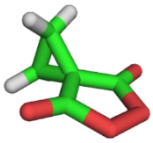
Synthetic Chemistry
Research within the group is split into two distinct areas. The development of practical synthetic methodology and the preparation of tool compounds of biological relevance. Our approach to discovery in each of these areas is driven by mechanistic knowledge and understanding.

Chemical Biology

Provision of chemical probes to dissect basic biology driven by:
- Knowledge of biological mechanism
- Structural knowledge
- Molecular modelling



Ligand to target TRα



Reagent for a metal-free *syn*-dihydroxylation

Synthesis
Development of practical methods with three guiding principles:
- Reactions proceed at room temperature
- Reactions proceed in presence of moisture and air
- Reagents/catalysts accessible in three synthetic steps or fewer

For further information, please visit: www.strath.ac.uk/chemistry/staff/academic/nicktomkinson/

Selected Publications

1. **Fam49/CYRI interacts with Rac1 and locally suppresses protrusions**. *Nature Cell Biol*. **2018**, *20*, 1159-1171.
2. **Circadian clock component REV-ERBα controls homeostatic regulation of pulmonary inflammation**. *J. Clin. Invest*. **2018**. *128*, 2281–2296.
3. **Alkene Oxyamination using Malonoyl Peroxides: Preparation of Pyrrolidines and Isoxazolidines**. *J. Org. Chem*. **2018**. *83*, 6728–6740.
4. **Regioselective Reaction of Heterocyclic N-Oxides, an Acyl Chloride and Cyclic Thioethers**. *J. Org. Chem.* **2018**, *83*, 1510–1517.
5. **Molecular basis of fatty acid selectivity in the zDHHC family of S-acyltransferases revealed by click chemistry.** *Proc. Nat. Acad. Sci*. **2017**, *114*, E1365-E1374.

Materials and Computational

Academic Staff and Research Interests

The Materials and Computational Research group covers a diverse range of interests with an emphasis on applied, multidisciplinary projects. The group has a strong track record of working with industry in areas such as energy, lighting, displays, polymer science, bionanotechnology, biophysical chemistry, sensors and the food industry.

The activities of the section encompass inorganic, organic and polymer synthetic chemistry for the development of functional materials and devices. The work is complemented by substantial characterisation facilities and pioneering research into structure-property relationships. Research within this section also focuses on the structure and properties of molecules, macromolecules, metal-containing compounds, materials and biological systems.

For further information, please visit:
https://www.strath.ac.uk/research/subjects/chemistry/materialscomputational/

Staff Members	*Research Interests*
Dr Léonard Berlouis	Thermal analytical techniques for materials characterisation; electrochemical technology; implementation of redox flow batteries for medium to large scale energy storage from renewable (wind, PV) generators.
Professor Nico Bruns	Macromolecular chemistry at the interface of polymer chemistry and biotechnology: Biocatalytic atom transfer radical polymerizations (bioATRP); block copolymer- and protein cage-based nanoreactors; bio-inspired materials; polymerization-amplified biosensing; amphiphilic polymer conetworks.
Professor Peter A. G. Cormack	Polymer synthesis, porous polymers, microporous solids, polymer microspheres, self-assembly, molecular recognition, chemical functionalisation, separation science.
Dr Aruna Ivaturi	Growth of nanomaterials and thin films and fabrication of solar cells, smart windows, sensors, field effect transistors, batteries and solar water purification systems based on them.
Dr John Liggat	Polymer chemistry and physics including degradation, processing, morphology, physical properties and industrial applications; thermal analysis and evolved gas analysis.
Dr David Palmer	Computational chemistry, biophysical chemistry, drug discovery molecular solvation, molecular recognition, self-assembly, spectroscopy, informatics.
Professor Tell Tuttle	Application of computational methods to solve pending chemical problems. Particular emphasis in the spheres of organic reactivity, bionanochemistry and soft matter (gels, emulsions).

Dr Léonard Berlouis

Contact Details

Phone: +44 (0)141 548 4244; Email: l.berlouis@strath.ac.uk

Career Synopsis

- 2007 – present: Reader in Physical Chemistry, University of Strathclyde,
- 1998 – 2007: Senior Lecturer , University of Strathclyde
- 1991 – 1998: Lecturer in Chemical Technology, University of Strathclyde
- 1982 – 1991: Research Scientist, *Wolfson Centre for Electrochemical Science, Department of Chemistry, University of Southampton*

Research Interests

Applied electrochemistry; redox flow batteries for medium to large scale energy storage; hydrogen evolution reaction in alkaline electrolysers; hydrogen storage materials; application of thermal analytical methods (DSC, TGA, TPD-MS) for materials characterisation; *in-situ* optical techniques to probe the metal(semiconductor)/electrolyte interface, *viz.* electrolyte electroreflectance, ellipsometry, surface enhanced resonant Raman spectroscopy and surface second harmonic generation.

Department webpage: http://www.strath.ac.uk/chemistry/staff/academic/leonardberlouis/

Selected Publications

1. B.G. McMillan, L.E.A. Berlouis, F.R. Cruickshank and P.F. Brevet, "Reflectance and SERS from an ordered array of gold nanorods.", Electrochimica Acta, 53 (2007) 1157-1163.
2. L.E.A. Berlouis, C. Jubin, B.M. McMillan, J. Morrow, M.D. Spicer, P.K. Tang, O. Bordelanne and M. Weston, "Enhanced Hydrogen Storage in Ni/Ce Composite Oxides". Physical Chemistry Chemical Physics 9 (2007) 6032-39.
3. Y. El Harfouch, E. Benichou, I. Russier-Antoine, G. Bachelier, C. Jonin, L. Berlouis and P.F. Brevet, "Combined roughness and electric polarization for the local-field enhancement of the second harmonic response from a silver-electrolyte interface." Physical Review B 79 (2009) 113407.
4. P. Leung, X. Li, C. Ponce de León, L. Berlouis, C.T. John Low and F.C. Walsh, "Progress in redox flow batteries, remaining challenges and their applications in energy storage." RSC Advances 2 (2012) 10125-10156.
5. Daniel Chade, Leonard Berlouis, David Infield, Peter Tommy Nielsen and Troels Mathiesen, "Deactivation Mechanisms of Atmospheric Plasma Spraying Raney Nickel Electrodes." Journal of the Electrochemical Society 163(3) (2016) F308-F317.
6. Frank C. Walsh, Carlos Ponce de Léon, Leonard Berlouis, George Nikiforidis, Luis F. Arenas-Martínez, David Hodgson, David Hall, "The development of Zn-Ce hybrid redox flow batteries for energy storage and their continuing challenges", ChemPlusChem, 80(2) (2015) 288-311.
7. M A Alqassim, N Nic Daied, M R Jones and L E A Berlouis, "A thermoanalytical, x ray diffraction and petrographic approach to the forensic assessment of fire effected concrete in the United Arab Emirates.", Forensic Science International 264 (2016) 82-88.
8. D. Bryans, B.G McMillan, M. Spicer, A. Wark and L. Berlouis, "Complexing Additives to Reduce the Immiscible Phase Formed in the Hybrid $ZnBr_2$ Flow Battery" Journal of The Electrochemical Society, 164 (13) (2017) A3342-A3348.
9. Declan Bryans, Véronique Amstutz, Hubert H. Girault and Léonard E. A. Berlouis, "Characterisation of a 200 kW/400 kWh Vanadium Redox Flow Battery", Batteries (2018) 4 …, MDPI, Beijing, CHINA, *in press*.

Professor Nico Bruns

Photo: Christopher Schaller ©

Contact Details

Phone: +44 (0)141 548 4648; Email: nico.bruns@strath.ac.uk
Twitter: https://twitter.com/Bruns_Lab; @Bruns_Lab
Google Scholar: Link
ORCID: https://orcid.org/0000-0001-6199-9995

Career Synopsis

- 2018 – present: Professor of Macromolecular Chemistry, University of Strathclyde
- 2013 – 2018: Associate Professor of Macromolecular Chemistry, Adolphe Merkle Institute, University of Fribourg, Switzerland
- 2008 – 2013: Habilitand (Independent Research Group Leader), Department of Chemistry, University of Basel, Switzerland
- 2007 – 2008: Postdoctoral Researcher, Department of Chemical Engineering, University of California, Berkeley, USA
- 2003 – 2007: PhD in Chemistry, University of Freiburg, Germany

Research Interests

Synthetic polymers have contributed to many innovations in all aspects of modern life. Significant progress has been made in synthetic methods to obtain functional polymers, in the fabrication of polymeric nanostructures and in the fundamental understanding of their physicochemical properties. However, compared to the properties and functions of **nature's macromolecules**, even the most sophisticated synthetic polymers still appear to be simple and only offer comparably basic functionality. Proteins are fascinating macromolecules, particularly from a polymer chemist's point of view. **The vast variety of functions that proteins can fulfill is not seen in any synthetic material.** Enzymes for example act as catalysts, while other proteins fluoresce or control transport across cell membranes. Moreover, certain proteins can self-assemble into nanocontainers and nanoreactors. All these functions are essential molecular mechanisms, enabling life and rendering living tissue responsive and adaptive.
My research encompasses an **interdisciplinary, bio-inspired approach that combines polymer chemistry and protein engineering** to create new opportunities for the sustainable synthesis of polymers and to design, engineer and realize materials and nanosytems with unprecedented new functions. Examples are the use of **enzymes as catalysts for atom transfer radical polymerizations**, to develop **polymer- and protein-based nanoreactors** for enzymatic reactions, and to use **proteins as force-responsive sensor molecules** in fiber-reinforced composite materials.

For further information, please visit:
http://ami.swiss/en/groups/macromolecular-chemistry/

Selected Publications

1. S. J. Sigg, F. Seidi, K. Renggli, T. B. Silva, G. Kali, N. Bruns, *Macromol. Rapid Commun.* **2011**, *32*, 1710.
2. T. B. Silva, M. Spulber, M. K. Kocik, F. Seidi, H. Charan, M. Rother, S. J. Sigg, K. Renggli, G. Kali, N. Bruns, *Biomacromolecules* **2013**, *14*, 2703.
3. K. Renggli, M. G. Nussbaumer, R. Urbani, T. Pfohl, N. Bruns, *Angew. Chem., Int. Ed.* **2014**, *53*, 1443.
4. M. Rother, J. Barmettler, A. Reichmuth, C. Rytka, O. Glaied, J. V. Araujo, U. Pieles, N. Bruns, *Adv. Mater.* **2015**, *27*, 6620.
5. O. Rifaie-Graham, S. Ulrich, N. F. B. Galensowske, S. Balog, M. Chami, D. Rentsch, J. R. Hemmer, J. Read de Alaniz, L. F. Boesel, N. Bruns, *J. Am. Chem. Soc.* **2018**, *140*, 8027.

Professor Peter A. G. Cormack

Contact Details

Phone: +44 (0)141 548 4951; Email: Peter.Cormack@strath.ac.uk

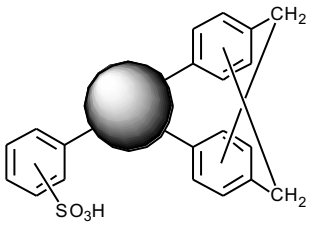
Career Synopsis

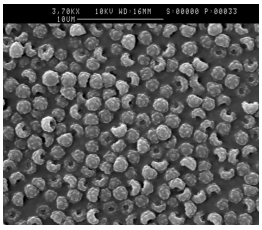
- 2017 – present: Head of Materials & Computational Chemistry
- 2016 – 2017: Deputy Head of Department of Pure and Applied Chemistry
- 2015 – 2018: Associate Dean (International Research), Faculty of Science
- 2009 – present: Professor, University of Strathclyde
- 2007 – 2009: Reader, University of Strathclyde
- 2004 – 2007: Senior Lecturer, University of Strathclyde
- 1998 – 2004: ICI Lecturer and Lecturer, University of Strathclyde

Research Interests

Polymer synthesis, porous polymers, microporous solids, polymer microspheres, self-assembly, molecular recognition, polymer functionalisation, separation science.

Within the Cormack Group at the University of Strathclyde, we specialise in the **synthesis and use of functional organic materials, especially polymeric materials, for** a broad spectrum of end applications (including high performance chemical separations, bioanalysis, environmental and forensic analysis, ion-exchange, metrology, films, coatings, proteomics, diagnostics, catalysis and drug delivery). We collaborate with a number of international academic partners and with industry on these research programmes.





Typically, our polymers are prepared using a broad-range of synthetic methodologies, including radical polymerisation, step-growth polymerisation, template-directed synthesis and solid-phase synthesis, and are characterised using a broad range of methods (NMR, FT-IR, GPC, SEM, BET, *etc.*). The development and exploitation of **molecularly imprinted polymers, microporous solids, functionalised polymers, polymer beads, branched polymers, self-assembling systems and polymer resins** are of special interest.

For further information, please visit: http://www.strath.ac.uk/staff/cormackpeterprof

Selected Publications

1. N. Fontanals, R. M. Marcé, F. Borrull and P. A. G. Cormack, *Polym. Chem.* **2015** 6, 7231-7244
2. G. Simon, M. A. B. Andrade, D. Roolvink, P. A. G. Cormack, M. O. Riehle, A. L. Bernassau, *IEEE International Ultrasonics Symposium* (IUS). IEEE, **2016**. 7728638
3. C. Rossetti, M. A. Świtnicka-Plak, T. G. Halvorsen, P. A. G. Cormack, B. Sellergren and L. Reubsaet, *Scientific Reports*, **2017**, 7, 44298
4. J. M. Tobin, T. J. D. McCabe, A. Prentice, S. Holzer, G. O. Lloyd, M. J. Paterson, V. Arrighi, P. A. G. Cormack and F. Vilela, *ACS Catal.*, **2017**, 7, 4602-4612
5. P. A. G. Cormack, N. N. S. Subri and S. N. A. M. Jamil, *J. Appl. Polym. Sci.*, **2018**, 135, 45677

Dr Aruna Ivaturi

Contact Details
Phone: +44 (0) 141 548 4398; Email: aruna.ivaturi@strath.ac.uk

Career Synopsis

- Dec 2017 – present: EPSRC Fellow, University of Strathclyde, Glasgow, UK
- May 2017 – present: Strathclyde's Chancellor's Fellow and Lecturer, University of Strathclyde, Glasgow, UK
- 2015 – 2017: Research Associate, School of Chemistry, University of Edinburgh, UK
- 2011 – 2014: Research Associate, Institute of Materials Processes and Energy Engineering & Institute of Photonics, Heriot Watt University, UK
- 2009 - 2010: Research Associate, Nanoscience Centre, Department of Engineering, University of Cambridge, UK
- 2007 - 2008: Humboldt Fellow, Institute of Technology for Nanostructures, Faculty of Engineering, University of Duisburg-Essen, Germany
- 2006 – 2007: Research Associate, Institute of Technology for Nanostructures, Faculty of Engineering, University of Duisburg-Essen, Germany

Smart Materials Research and Device Technology (SMaRDT) Group

Dr Aruna Ivaturi is EPSRC Fellow, Chancellor's Fellow and Lecturer (Assistant Professor) at University of Strathclyde. She is also Alexander von Humboldt Fellow (alumni). Her principal research interests lie in the synthesis of nanomaterials, development, fabrication and optimisation of devices based on them for energy, environment and healthcare sectors. She has made important scientific and technological contributions – for example, switchable coatings for energy saving windows, materials and devices for sensing technologies, solar energy conversion, solar photocatalyst and dye-sensitised electrochromic devices. Over the last eight years her main research focus has been in the development of novel materials and devices for solar energy conversion especially the emerging new PV technologies (Spectral conversion, Dye sensitised and Perovskite solar cells). Recently, she has been awarded the EPSRC Fellowship (funding of ~ £1.1 Million) to develop the challenging field of Elastic Perovskite PV research in the UK.
Her (SMaRDT) group is presently working on multidisciplinary projects in the following sectors:
a) Energy (Engineering and Physical Sciences Research Council, EPSRC funded project): Elastic Perovskite Solar Cells
b) Environment (UK-India Education and Research Initiative, UKIERI funded project): Biosorbants and Photocatalysts for Waste Water Remediation.
c) Healthcare (Royal Academy of Engineering, RAE funded project): Wearable Glucose Sensors
For further information, please visit: https://pureportal.strath.ac.uk/en/persons/aruna-ivaturi

Research Facilities

All the basic kits required for growth of nanomaterials using chemical routes, hydrothermal bath, programmable hot plate, spin-coater, convection oven, muffle furnace, glovebox with inbuild spincoater and evaporator (for evaporation of both organic and inorganic materials) for the device fabrication. Basic solar cells measurements facilities: Solar simulator with IV measurement unit, Potentiostat, galvanostat with electrochemical impedance spectroscopy. Material Characterisation facilities: UV-VIS spectrophotometer and Atomic Force Microscope.

Selected Publications

Book Chapters

1. **A. Ivaturi** and H. Upadhyaya, Upconverison and Downconversion Processes for Photovoltaics in *A Comprehensive Guide to Solar Energy Systems with special focus on Photovoltaic Systems*, Ch 13, Eds. Trevor M. Letcher and Vasilis M. Fthenakis (Academic Press, Elsevier, Cambridge, Massachusetts, US) (2018).
2. Y. Hu, **A. Ivaturi**, and N. Robertson, Dye-Sensitised Solar Cells, *RSC Nanoscience and Nanotechnology.* Ch 8, Eds. P. Skabara and M. A. Malik (Cambridge: Royal Society of Chemistry) (2017)

Journal Publications

1. S. Fischer, **A. Ivaturi**, K. W. Krämer, P. Jakob, R. Martin-Rodriguez, A. Meijerink, B. Richards, J. C. Goldschmidt, Upconversion solar cell measurements under real sunlight, Optical Materials **84,** 389 (2018).
2. G. Odiling, **A. Ivaturi**, E. Chatzisymeon, N. Robertson, Improving carbon coated TiO_2 films with a $TiCl_4$ treatment for photocatalytic water purification, ChemCatChem, **10,** 234 (2018).
3. Y. Hu, A. Abate, Y. Cao, **A. Ivaturi**, S. M. Zakeeruddin, M. Grätzel and N. Robertson, High absorption coefficient cyclopentadithiophene donor-free dyes for liquid and solid-state dye-sensitized solar cells, *Journal of Physical Chemistry C*, **120**, 15027 (2016).
4. M. Maciejczyk, **A. Ivaturi**, N. Robertson, SFX as a low-cost 'Spiro' Hole Transport Material for efficient Perovskite Solar Cells, *Journal of Materials Chemistry A*, **4**, 4855 (2016).

Dr John Liggat

Contact Details

Phone: +44 (0) 141 548 4351; Email: j.j.liggat@strath.ac.uk

Career Synopsis

- 2015 – present: Vice-Dean (Knowledge Exchange)
- 2014 – 2015: Associate Dean (Knowledge Exchange)
- 2009 – present: Reader, University of Strathclyde
- 2003 – 2009: Senior Lecturer, University of Strathclyde
- 1994 – 2003: Lecturer, University of Strathclyde
- 1989 – 1994: Polymer Scientist, ICI

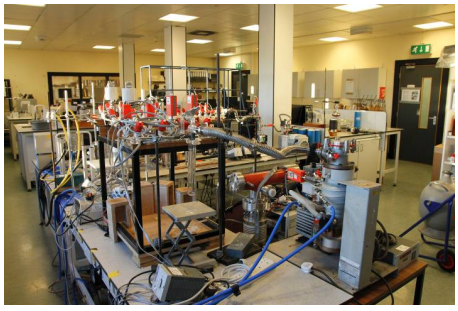
Research Interests

Polymer chemistry and physics including degradation, processing, morphology, physical properties and industrial applications; thermal analysis and evolved gas analysis.

Environmental and partial discharge degradation of photovoltaic backsheets

Partial discharge is a localised dielectric breakdown under high voltage of a solid or fluid insulator that does not bridge the space between two conductors. It is usually associated with voids and has been described as the fastest and most dangerous degradation process that can occur in electrical insulation. In a multi-disciplinary approach we have been studying the complex relationship between weathering, dielectric breakdown and polymer structure and morphology.

Evolved gas analysis



A major analytical tool in the group is thermal volatilisation analysis (TVA) a versatile technique capable of analysing in real time the evolution of volatile species from an analyte, cryogenically collecting evolved volatiles and characterising the individual components by mass spectrometry. In our most recent work TVA has been re-visited, updated and re-applied to new applications and now has become an indispensable tool for the study of various aspects of volatiles evolution analysis, increasingly in relation to catalyst characterisation and inorganic chemistry.

Polyurethanes

As uniquely versatile materials with diverse applications, polyurethanes have been a constant interest of the research group over many years. Current research includes the optimisation of intumescent fire-retardant foams, transparent adhesives for optical applications and self-healing coatings.

For further information, please visit: http://www.strath.ac.uk/chemistry/staff/academic/johnliggat

Selected Publications

1. R. Tang, J.J. Liggat, W.W. Siew, *Partial discharge behaviour of biaxially orientated PET films: The effect of crystalline morphology,* Polymer Degradation and Stability, **2018**, *155*, 122-129. DOI:10.1016/j.polymdegradstab.2018.07.009

2. A.W. Grzelak, P. Boinard, J.J. Liggat, *The influence of diol chain extender on morphology and properties of thermally-triggered UV-stable self-healing polyurethane coatings*, Progress in Organic Coatings, **2018**, *122*, 1-9. DOI:10.1016/j.porgcoat.2018.04.032

3. S. McCreath, P. Boinard, E. Boinard, P. Gritter, J.J. Liggat, *High clarity poly(caprolactone diol)-based polyurethane adhesives for polycarbonate lamination: Effect of isocyanate and chain-extender,* International Journal of Adhesion and Adhesives, **2018**, *86*, 84-97. DOI:10.1016/j.ijadhadh.2018.08.003

Dr David Palmer

Contact Details

Phone: +44 (0)141 548 4178; Email: david.palmer@strath.ac.uk

Career Synopsis

- 2014 – present: Lecturer, University of Strathclyde,
- 2012 – 2014: Marie Curie Research Fellow, University of Strathclyde
- 2010 – 2012: Postdoctoral Research Associate, Max Planck Institute for Mathematics in the Sciences, Germany
- 2008 – 2010: Postdoctoral Research Associate, Aarhus University, Denmark
- 2004 – 2008: PhD in Chemistry, University of Cambridge

Research Interests

We use theory, simulation and informatics to explore the physical and chemical factors that underlie biological processes. Several of our research projects are carried out with collaborators from industry. Recent examples include the design of an enzyme for use in food manufacturing (with Chr. Hansen A/S, Copenhagen) and the development of methods to model molecular solvation in drug discovery (with AstraZeneca, Sweden).

Integral Equation Theory of Molecular Liquids: We are developing *chemically accurate* methods for modelling biomolecules in solution based on the Integral Equation Theory (IET) of Molecular Liquids. We have recently extended these methods to compute pharmaceutically relevant properties, such as solubility of crystalline organic molecules, and protein-ligand binding free energies.

Biochemistry: We apply molecular simulation and informatics methods to study the structure, dynamics and function of biologically relevant molecules (DNA, proteins, etc). Proteins and other biomacromolecules exhibit internal dynamics on a wide range of time-scales from bond stretching vibrations involving hydrogen to large-scale conformational changes involving whole domain movements. The slower, large-scale internal dynamics are important for the biological function of proteins, but they are difficult to study using standard computational methods, which do not permit a full sampling of these conformational degrees of freedom. We are developing hybrid atomistic/coarse-grained simulation methods that allow enhanced sampling of the dynamics of biomacromolecules.

Cancer diagnostics: We are currently collaborating with Dr Matt Baker to develop serum-based methods for diagnosing brain tumours and other diseases. Here we apply advanced machine learning algorithms to make accurate diagnostic predictions from spectral data.

Personal webpages: http://www.palmer-lab.com and http://www.clinspecdx.com

Selected Publications

1. Fusani, L.; Wall, I.; Palmer, D. S.; Cortes, A., *Bioinformatics**, 2018,** 34, 1947–1948*
2. Ansari, S.; Coletta, A.; Kirkeby Skeby, K.; Sørensen J.; Schiott, B.; Palmer D.S. *J. Phys. Chem. B.* ***2016****, 120, 10453–10462.*
3. M. Misin, M. V. Fedorov, D. S. Palmer, *J. Phys. Chem. B,* **2016***, 120, 975–983*
4. E. L. Ratkova, D. S. Palmer, M. V. Fedorov, *Chem. Rev.*, **2015***, 115,* 6312–6356.
5. Palmer D. S.; Misin, M.; Fedorov, M. V.; Llinas, A. *Mol. Pharmaceutics*, **2015**, 12, 3420−3432.

Dr Tell Tuttle

Contact Details

Phone: +44 (0)141 548 2290; Email: tell.tuttle@strath.ac.uk

Career Synopsis

- 2018 – present: Professor of Theoretical Chemistry, University of Strathclyde
- 2016 – present: Director of Research (Chemistry)
- 2010 – 2018: Senior Lecturer, University of Strathclyde,
- 2007 – 2010: Lecturer, University of Strathclyde
- 2004 – 2006: Postdoctoral Fellow, Max-Planck-Institut für Kohlenforschung, Mühleim an der Ruhr, Germany

Research Interests

Research in the TuttleLab is focused on the concept of reducing molecular search spaces. This involves the use of computational methodology to inform, focus and drive the direction of molecular research. The group works in close collaboration with experimental colleagues to ensure the results from our design work can be directly implemented in a practical laboratory. The process of reducing molecular search spaces involves three phases: (1) rationalising and understanding existing systems; (2) isolating the governing molecular processes; and (3) predicting new systems with enhanced/desirable properties and reactivities. A variety of different methods are used in pursuit of this goal, including ab initio, DFT, semi-empirical, MM, coarse grain and hybrid QM/MM methodologies.

Group webpage: http://www.tuttlelab.com

Selected Publications

1. S. Zhou, G. M. Anderson, B. Mondal, E. Doni, V. Ironmonger, M. Kranz, T. Tuttle, J. A. Murphy, *Chem. Sci.* **2014**, *5*, 476–482.
2. P. W. J. M. Frederix, G. G. Scott, Y. M. Abul-Haja, D. Kalafatovic, C. G. Pappas, N. Javid, N. T. Hunt, R. V. Ulijn, T. Tuttle, *Nature Chem.* **2015**, *7*, 30-37.
3. G. G. Scott, P. J. McKnight, T. Tuttle, R. V. Ulijn, *Adv. Mater.* **2016**, *28*, 1381-1386.
4. A. Lampel, S. A. McPhee, H.-A. Park, G. G. Scott, S. Humagain, D. R. Hekstra, B. Barney Yoo, P. W. J. M. Frederix, T.-D. Lee, R. R. Abzalimov, S. G. Greenbaum, T. Tuttle, C. Hu, C. J. Betting, R. V. Ulijn, *Science*, **2017**, *356*, 1064-1068.
5. A. Lampel, R. V. Ulijn, T. Tuttle, *Chem. Soc. Rev.* **2018**, *47*, 3737-3758.