Institution: University of Sussex

Unit of Assessment: UoA 8 Chemistry

OVERVIEW

The UoA8 submission consists of the Chemistry Department of the School of Life Sciences. Research in the School of Life Sciences is organised into five Subject Groups: Biochemistry and Molecular Biology; Chemistry; Evolution, Behaviour and Environment; Genome Damage and Stability; Neuroscience. Research within Chemistry covers the three 'classic' sub-disciplines of inorganic, physical and organic, with a focus on the two main research themes of Drug Discovery and Energy.

RESEARCH STRATEGY

Significant changes since RAE 2008

The arrival of a new Vice-Chancellor (Prof. Michael Farthing) in late 2007 marked the beginning of a sea-change in the level of institutional commitment to Chemistry at the University of Sussex and, in the last 3 years, the Unit has benefited from considerable University investment in new initiatives, appointments and laboratory refurbishment. Also, with the appointment of Prof. Laurence Pearl FRS as Head of the School of Life Sciences in 2009, Chemistry was reconstituted as a distinct Subject Group within the School, with Prof. Geoff Cloke FRS as Chair. Chemistry as currently constituted sustains an external identity in the larger UK and international community as a distinct Chemistry Department, while benefiting administratively and financially from its status as one of the Subject Groups within the overall School structure. The restructuring of Chemistry in 2009 resulted in the departure of a number of under-performing staff, but this has been more than compensated for in subsequent years by high-quality new appointments across the sub-disciplines. The Organic Group, in particular, has been largely rebuilt, and the Department as a whole is a confident, growing entity with a culture of successful collaboration. The viability of the Department is now secure as a research unit and translational activities now dominate the planning and development of research.

Vision and strategic plans

Research in Chemistry spans the traditional areas of inorganic, organic and physical Chemistry, and more-interdisciplinary activities such as bio-inorganic, materials chemistry, and nanoscience. Over the last 3 years, the Department has deliberately focused its traditional strengths in molecular synthesis, computational chemistry and chemical physics into two main, but not exclusive, research topics: Drug Discovery and Energy.

- *Drug Discovery*, which has medicinal chemistry and organic synthesis at its core, includes strong links with Biochemistry and Molecular Biology, the Genome Damage and Stability Centre and Brighton and Sussex Medical School. Drug design, synthesis and delivery are key goals here.
- The *Energy Group* seeks functional solutions to the correlated problems of peak oil and carbon emissions. Research towards this goal is focused on inorganic synthesis and small-molecule activation, materials and nanostructure fabrication.

These two topics each aspire to the delivery of a 'moonshot' – a goal of great significance whose attainment would be transformational, but where the route to its achievement will itself generate substantial outputs short of the ultimate aim, and deliver multiple technical improvements with wide-ranging applicability. Thus, Drug Discovery aims to put a drug into clinical use in oncology and in neurodegeneration, while the Energy Group aims to develop a functional electrocatalytic system (driven by solar power) for the conversion of carbon oxides to high-value organic compounds/fuels.

Stated aim

To sustain a breadth of high-quality research activity from molecule to system, with explicit 'high points' in synthetic chemistry, small-molecule activation, materials and nanochemistry, with a functional commitment to translational opportunities across all our research activities.

Strategy

In order to enhance research activity, particularly in the two areas of Drug Discovery and Energy, the main strategies are:

- investment in new posts to build on existing strengths and to complement expertise in these two priority research areas, together with provision of the necessary infrastructure; and
- research grant capture. The Department also actively seeks interdisciplinary links – the Drug Discovery Steering Group (see www.sussex.ac.uk/lifesci/drugdiscovery/about/steeringgroup), for example, is a formal body comprised of internal and external users and industrial representatives (including Dr Brian Cox, UK Sector Head, Global Discovery Chemistry, Novartis and Dr Paul England, Senior Vice President Research at Aurora Biosciences Corporation in San Diego). This Group validates targets, and promotes and formalises links with both internal and external bodies, including the Genome Damage and Stability Centre, the Brighton and Sussex Medical School, and Novartis.

Building for the future

As the University of Sussex passes its fiftieth year, many of the innovative campus buildings designed by Sir Basil Spence are beginning to show their age, and are increasingly unsuited to the requirements of modern world-class scientific research. The University has therefore committed to a major building programme of £120M over 5 years as a cornerstone of its new strategic plan. In 2017, Chemistry will move into a £60M Life Sciences Research building, which will provide state-of-the-art laboratory and office accommodation for 75 research groups, as well as managed collaborative research facilities. The building will also house a 300-slot teaching laboratory able to accommodate multiple laboratory practical classes in parallel. The sustainability of our research activities is a key plank of the overarching research strategy, and environmental sustainability is at the heart of the new Life Science Research building. We are designing the new Life Science Research building to incorporate the waste heat generated by research equipment into a 'virtual boiler-house' that will provide the ambient warmth and domestic hot water, and drive the passage of fresh air throughout the building. Combined with an extensive use of materials with high thermal inertia, piped natural lighting, grey water, and photovoltaic technology, we are aiming for a building where the running costs are minimised so that the maximum proportion of hard-won income can be dedicated to supporting the research.

PEOPLE

Staffing strategy and staff development

Chemistry's staffing strategy aims to build and sustain capacity in key research areas, at a high level of scientific quality. All appointments are primarily determined by research quality and we are currently maintaining a policy of only appointing at Senior Lecturer/Reader level or above. Following the major restructuring in 2009, we have made new University-funded appointments in Chemistry as follows:

New appointment	Specialism	Previous employer
Prof. Simon Ward	Medicinal Chemistry	GlaxoSmithKline
Prof. Wendy Brown	Physical Chemistry	University College London
Prof. Mark Bagley	Organic Chemistry	University of Cardiff
Dr John Spencer	Organic Chemistry	University of Greenwich
Dr Oscar Navarro	Metal Mediated Organic Synthesis	University of Hawaii
Dr Alfredo Vargas	Computational Chemistry	University of Würzberg
Dr Georgios Kostakis	Inorganic Materials Chemistry	Karlsruhe Institute of Technology

Indeed, since RAE 2008 there has been a greater than 50 per cent 'turnaround' in Chemistry faculty, with 9 new appointees/replacements. In this context, the role of our distinguished senior colleagues (Kroto, Nixon, Lappert and McCaffery), who continue to play a very active part in the Department, has been invaluable since they have acted as mentors and role models for our new faculty members. These new appointments have been strongly supported by the School and the

University Strategic Development Fund, and have been provided with refurbished laboratory space, start-up funds for equipment and PhD studentships.

Career development support; Concordat to Support the Career Development of Researchers: faculty are appraised annually, normally by the Head of Department. In addition, there is a process of annual review, outside of appraisal, whereby everyone is considered for promotion or discretionary increments. The University now implements the 'Concordat to Support the Career Development of Researchers', thus ensuring that research staff receive appropriate mentoring and appraisal from line-managers or senior colleagues.

Personal research fellowships: the Department has a definite aim of attracting excellence through independent research fellows; e.g. Osborne was a URF in the previous submission and is now a permanent member of faculty. The School of Life Sciences has recently instituted a formal policy on Career Progression for Independent Fellows, hence, Crossley (Royal Society URF, October 2008–16, extension granted) will be interviewed for the post of Reader, which will be created, at a time of his choosing during his extension period. Ward has hosted a Marie Curie Fellow (Dr Tony Ocasio).

International visiting scholars: as part of our strategy to actively seek external academic collaborations, the Department has hosted a considerable number of overseas visiting scientists: 2012 – Dr Sulaiman Mohammed Alfadul, King Abdulaziz City for Science and Technology, Saudi Arabia; 2011 – Dr Jasbir S. Bedi, Guru Angad Dev Veterinary and Animal Sciences University, India; 2009 and 2011 – Prof. Heyong He, Chemistry Department, Fudan University, Shanghai, PRC; 2008 – Prof. Tetsuzo Yoshimura, Optoelectronic Molecular Micro/Nano Systems, Department of Bionics, Tokyo University of Technology, Japan; 2008 and 2011 – Dr Thomas Bitzer, Infineon Technologies Austria AG; 2008 – Prof. Weidong Chen, Laboratoire de Physicochimie de l'Atmosphère, Université du Littoral Côte d'Opale, France; and 2012–present – Dr Carol Villalonga-Barber, University of Athens. These visitors have bought complementary expertise to the Drug Discovery and Energy Groups, resulting in joint publications and new initiatives.

Equality and diversity: the University, through the Doctoral School, promotes equalities amongst its doctoral and early-career researcher population, with a number of training events to spread good practice and a monitoring framework that ensures compliance with Equalities legislation and policies, amongst other matters. Supervisors of research students are formally required to ensure that they act in accordance with Equalities legislation and policy and that their students are aware of the rights and opportunities this affords them. The University has been awarded an Athena SWAN Bronze university award, and has joined the Athena SWAN Charter. The most recent (2013) Professorial appointment in Chemistry is a woman (Brown).

Research students

PGR numbers (FTEs) from August 2008–July 2013 were as follows: 2008 = 21; 2009 = 27; 2010 = 40; 2011 = 37; 2012 = 27 and 2013 = 26.

PGR recruitment: the School of Life Sciences has a defined policy whereby externally-funded UK/EU (e.g. EPSRC DTA, Industrial CASE, etc.) PhD positions are matched by School-funded ones, with a guaranteed minimum of 12 per year. These are allocated within the School via a competitive process based on research proposals submitted by faculty and advertised externally. Chemistry also sustains a strong cohort of PhD students through the active recruitment of high-quality overseas students from developing economies. The Department has particularly strong links through faculty members with Iraq (Abdul-Sada) and China (Chen), and has a regular influx of fully-funded PhD students on government scholarships from these countries (e.g. in the above details of PGR numbers, 16 per cent in 2011 and 23 per cent in 2013 were students on overseas scholarships).

PGR training and support mechanisms: all PGR students in Chemistry are assigned a secondary supervisor from a cognate sub-discipline of the subject whose primary role is pastoral; the secondary supervisor will also act as internal examiner for the *viva*. All PGR students undergo

formal, mandatory Safety, Fire Extinguisher, Cryogenics and First Aid training prior to the commencement of laboratory work. A number of specific Research Development and Transferable Skills Courses (e.g. Impact and Research Community Skills, Thesis Writing and a variety of Scientific Software training courses) are available and PGRs are obliged to choose and attend at least 2 per year in the first 2 years of their PhD, thus ensuring a bespoke training environment. There is an annual Life Sciences Postgraduate Symposium to which all PGRs in the School are required to present a Poster in their second year and a 20-minute oral presentation in their third year. In Chemistry, all PGRs attend a minimum of one major national or international conference during their PhD degree and present their work (these are generally funded by the Doctoral Training Support Grants allocated to supervisors).

PGR progress monitoring: all Chemistry PGRs have a Progression interview with their supervisors towards the end of their first year, to ensure that the student has a sound understanding of the project and its direction, and both supervisors and student complete Annual Reports covering the student's research progress and any issues which may need attention. In addition, a mock *viva* is carried out by the secondary supervisor at the end of Year 2, to ensure that the student has an established plan for the final year of his/her study and to identify any problems. Feedback from the reports and interviews is monitored by the Directors of Doctoral Studies for both Chemistry and Life Sciences as a whole, to identify any issues which need attention.

INCOME, INFRASTRUCTURE AND FACILITIES

Specialist research infrastructure and facilities

As outlined in the Strategy section above and as detailed below, the new Drug Discovery and Energy initiatives have been supported by investment in new equipment, in particular small-molecule, powder and protein X-ray diffraction instrumentation, solvent purification systems, mass-directed purification systems, and automated microwave synthesisers. Hence the Department is now equipped with *c*ommunal state-of-the-art equipment for:

X-ray diffraction: Enraf-Nonius CAD4 small-molecule single crystal diffractometer, Rigaku 007HF rotating anode generator, VariMax-HF mirrors, Saturn 944+ CCD detector and Oxford Cryosystems 700 cryostream for macromolecule, single-crystal and fibre; Agilent Gemini E Ultra with Eos CCD detector, Enhance (Mo) source, Enhance Ultra (Cu) sources, and Oxford Cryosystems 600 cryostream for small molecule single-crystal work.

NMR spectroscopy: 4-channel 600 MHz spectrometer, equipped with both an autotuning X{^{1}H-^{19}F} broadband probe and an 1H{^{13}C/^{15}N/^{31}P/^{2}H} AutoPenta Probe for biological samples; 500 MHz instrument with an inverse ^{1}H{^{13}C} probe for small-molecule structure-elucidation tasks; 400 MHz spectrometer with an autotuning X{^{1}H-^{19}F} broadband probe for inorganic chemistry.

Mass spectrometry: 9 instruments incorporating GC and LC 'front-ends' providing EI, CI, DCI, LSIMS, MALDI, ESI, APCI, APPI, ICP and MSMS techniques via ion trap, triple quadrupole and hybrid systems).

High-performance computing: dedicated 16 node, 128 core InfiniBand connected Cluster. All instruments are in managed shared facilities run by experienced Academic Facility Managers, and fully available to all trained research faculty and students.

In addition, there is a wide range of *specialist equipment in individual research laboratories* available to other users: ReactIR system, Toepler Pump Gas Handling Line, Metal Vapour Synthesis Equipment, High-Pressure Equipment for Supercritical Fluid work, 6 MBraun Gloveboxes, MBraun Multiple Solvent Purification System, Jeol SEM M820 with EDS, Siemens D500 powder XRD, Veeco Dimension AFM/STM with c-AFM, VSW ESCA/XPS, UHV CVD deposition system, UHV system with ion-sputtering gun, LEED, Quartz microbalance, and e-beam metal evaporator, eDAQ and BASi potentiostats with photoelectrochemistry kit, automated CEM and Biotage microwave synthesisers, Biotage Isolera and ISCO flash and state-of-the-art Shimadzu mass-directed purification systems, Kr-Ion Gas laser offering 457, 488, 514, 528, 568, 647 nm excitation, Diode-pumped solid-state lasers (DPSS), Fluorescence Correlation

Spectroscopy (FCS), Total Internal Reflection Fluorescence Microscope (TIRFm), PhotoActivatable Localisation Microscope (PALM), Gaussian09 and ADF12.

Investment in infrastructure and facilities

The setting up of the Translational Drug Discovery Initiative headed by Ward has involved considerable investment from the University (£2.5M over 5 years) for personnel, new laboratory space and equipment (see above). Investment in X-ray Diffraction Equipment has also been considerable, with the purchase of both the Rigaku and Agilent X-ray Diffractometers within the last 4 years.

With the appointment of the new Chair in Organic Chemistry (Bagley), together with Spencer and Navarro, the Organic research space (both lab and office) has been refurbished (£200k) and re-equipped with monies from the RM Phillips fund, matched by the University (total £300k). Lab space for the new Chair of Physical Chemistry (Brown) has also been extensively refurbished (£200k).

Research funding portfolio

The Unit obtains research funding from the full range of sources, supporting the inter- and intra-disciplinary collaborative activities detailed in the final section. In order to ensure high-quality submissions and maximise success rates, all grant proposals are subject to a rigorous internal peer-review process prior to submission. Researchers notify all grant-application proposals in a *pro forma* document to the Head of School and Director of Research and Knowledge Exchange at least 6 weeks before a target submission date, detailing, *inter alia*, the research question addressed, the track record of the principal investigator and co-applicants in that research area, and what preliminary data will be available for inclusion in the proposal. The PI is also required to identify two 'critical friends' – senior researchers not directly involved in the application, but able to read the developing proposal critically and provide essential objectivity. The Head of School and DRKE provide feedback on the scientific strengths of the proposal. They also ensure that all the information has been provided to enable the University Research Office to progress the paperwork and undertake the negotiations that are often required with proposals to non-UK funding bodies and/or involving collaboration or networks with other institutions. Where (occasionally) a proposal is not judged to be sufficiently competitive on the basis of the *pro forma*, the Head of School has detailed discussions with the researcher to clarify the perceived shortcomings, and identify what needs to be done in order to bring the proposal up to a level that is ready for submission.

Research Councils and related: European Research Council (Cloke, PI Advanced Investigator 1.8M Euros 2010–15, Turner is a Senior Team Member on this grant); EPSRC (Cloke, PI £290k 2007–10; Brown, Co-I £925k 2012–16; Day, PI £95k 2010–12; Chen and Turner, CASE with PpTek £216k 2009-2013); ESRC/BBSRC/EPSRC/MRC/NERC New Dynamics of Ageing (Bagley, PI £335k 2009–12); EPSRC/BBSRC Strategic Network in Chemical Biology (Bagley, Co-I £218k 2011–14), BBSRC (Osborne, Co-I CASE £100k 2011–15), MRC (Ward, Co-I £1.9M 2013–18), EU (Ward, PI £152k 2012–14; Osborne, Co-I £517k 2008–12), Royal Society (Crossley, URF £795k 2008–16); EU (Turner, Marie Curie Reintegration Grant, 100k Euros, 2007–10).

Charities: Leverhulme Trust (Brown, PI £245k 2010–13; Crossley, PI £135k 2010–13); Wellcome Trust (Ward, PI £1.4M 2013–15; PI £4M 2014–17); Cancer Research UK (Ward, PI £267k 2012–13); Association For International Cancer Research (Osborne, Co-I £222k 2012–15).

Industry: Nexia/National Nuclear Laboratory (Cloke, £100k 2009–10), TSB-PpTek (Turner and Chen, £513k 2012–15), Oxford Nanopore (Spencer, £330k 2010–present), Astra-Zeneca (Spencer, Industrial CASE 2011–14).

Consultancies and professional services

A number of faulty formally consult with commercial or other organisations: Air Products (Cloke), Intel (Cloke), BioCrea Germany (Ward), Brighton and Sussex University Hospitals Trust (Turner), Phlorum Ltd (Viseux), Pastel Biosciences (Osborne), Tocris Ltd (Spencer), Astra-Zeneca (Spencer), Abcam Biosciences (Spencer), Cambridge Display Technology (Navarro). Of the monies arising from these consultancies, 85 per cent is available to the PIs' research budgets and are typically used to fund undergraduate research projects during the summer vacation.

Both the Centre for Mass Spectrometry and that for X-Ray Diffraction undertake external, commercial contract work

COLLABORATION OR CONTRIBUTION TO THE DISCIPLINE OR RESEARCH BASE

The Unit has a range of actively promoted collaborations, both intra- and interdisciplinary, with other Sussex UoAs, national and international Institutions, and industry. Key examples include: the Drug Discovery Group which, through the directed recruitment strategy and formation of the multi-disciplinary steering committee, now connects Chemistry to biomedical strengths in the School of Life Sciences and beyond, and has resulted in very substantial Wellcome Trust funding to Ward; in the Energy Group, the TSB-funded project of Chen and Turner on inorganic photocatalysis for gas purification with PpTek Ltd, and Cloke's U(III) mediated small-molecule activation project, which connects Sussex Chemistry with EU researchers through the ERC and EUFEN and with industry (National Nuclear Laboratory). These and other key examples are detailed below:

Bagley: synthetic organic methodology and medicinal chemistry. Steering Group Member of the SMS-Drug EPSRC-BBSRC-MRC-sponsored collaborative network in chemical biology, PI on the UK multi-institution, multi-disciplinary network 'New Dynamics of Ageing Programme'.

Brown: collaborates with astronomers and other scientists in the area of astrochemistry via participation in the COST network 'The Chemical Cosmo' and as investigator on the ITN grant LASSIE (Laboratory Astrochemical Surface Science in Europe).

Chen: nanomaterials for applications in green energy, the environment and biomaterials. Collaborates with PpTek Ltd on biogas treatment, Sensatech Research Ltd and Cummins Inc. in the USA on metal-oxide nanomaterial-based chemical sensors, the Blizard Institute at Barts and The London School of Medicine and Dentistry on developing intelligent biocompatible nanomaterials for neuroregeneration; extensive international academic collaboration, particularly with the Far East (Yoshimura at Tokyo University of Technology; He at Fudan University Shanghai; Woo-Lee at Kookmin University, South Korea; and Bao at Zhejiang University, China).

Cloke: major ERC-funded project on U(III) mediated small-molecule activation involves collaboration with Maron (Toulouse, named ERC-grant senior team member) on computational studies, UK and EU universities through the EUFEN COST network, and the UK National Nuclear Laboratory (PDRA and materials; resultant Patent Number WO2009007755). Project on multimetallic pentalene complexes and nanowires is supported by computational studies by Green (Oxford). Project on novel NHC metal complexes and applications to catalytic C-X bond-forming reactions in collaboration with Caddick (UCL) and Gois (University of Lisbon).

Navarro: collaborates with Turner at the University of Manchester (established through the NSF/EPSRC programme 'International Collaboration in Chemistry') and Cambridge Display Technology Ltd on Pd-mediated approaches to electro-active polymer synthesis.

Osborne: work on imaging involves collaboration with 6 partner institutes through the ITN network 'Imaging-DNA-Damage Response', with Sirigen Ltd on light-harvesting polymeric materials, with PhoteK Ltd on single-molecule detectors for bio-imaging, and with Pastel Biosciences on biomarkers.

Spencer: synthetic organic and medicinal chemistry. New synthetic methods for triple-negative breast-cancer drugs with the Genome Damage and Stability Centre (Downs, Sussex, UoA 5), stabilising p53 mutants with the LMB (Ferscht, Cambridge), synthesis of histone deacetylase inhibitors with Harvard Medical School (Bradner), design of cyclodextrins (Oxford Nanoportech) and regioselective routes to tetra-subsituted aromatics (Astra-Zeneca).

Turner: photocatalysis and semiconductors. TSB-funded project on inorganic photocatalysis for gas purification with PpTek Ltd; nanostructured semiconductor sensors with Cummins Inc.; magnetism, group theory and neutron scattering with Barnes (US DoE nuclear physics/Oak Ridge National Laboratory); liquid/amorphous diffraction and angular momentum theory with Siewenie (Los Alamos National Laboratory); magnetism, muon spin resonance and quantum systems with Giblin (Cardiff); uranium chemistry calculations in collaboration with Maron (Toulouse, named

ERC-grant senior team member).

Ward: the Translation Drug Discovery Group targets chemical biology and translational drug-discovery projects applied to DNA damage-repair proteins as approaches to deliver personalised cancer therapy, with the Genome Damage and Stability Centre (Carr, Caldecott, El-Khamisy, Hochegger, Baxter, Downs, Murray, Pearl, Oliver, Prodromou, Sussex UoA 5); cancer, leukaemia and cognition in collaboration with the Brighton and Sussex Medical School (Schmid, Chevassut, Gibbs, Sussex UoAs 4 and 5); addiction and mood disorders with Psychology (Stephens and King, Sussex UoA 4); trypanosomiasis with Biochemistry (Moore, Sussex UoA 5); cognition enhancers with GlaxoSmithKline; and respiratory syncytial virus with reViral. The group also has international collaborations with Partin (Colorado State, USA) and Zhou (Department of Pharmacology and Toxicology, Center for Addiction Research, University of Texas, USA) on AMPA positive allosteric modulators. Member of Arcade – FP7-funded EU consortium.

Abdul-Sada: environmental metabolomics. Collaborative research between the Mass Spectrometry group in Chemistry and the Environmental Toxicology group in Evolutionary Biology, Behaviour and Environment Subject Group (UoA 5), developing novel biomarkers for endocrine disruption.

Faculty academic esteem indicators

Chemistry faculty make a wide range of invited contributions to the academic community as a whole, encompassing journal editing (8), committee memberships (9), national and international grant review panels (9), plenary/keynote lectures at international conferences (25) and conference organisation (4). Examples of individual contributions of particular note are detailed below:

Bagley: Guest editor of *Pharmaceuticals* Special Edition; volume editor for *Science of Synthesis*; Advances in Synthetic Chemistry 2009, Edinburgh (Plenary); XIVth Conference on Heterocycles in Bio-organic Chemistry 2011, Brno, Czech Republic (Plenary); RSC Heterocycles and Synthesis Group 2013, QMUL (Plenary); Visiting Professorship (ECPM Strasbourg 2008–present); EPSRC panel member.

Brown: Member of RSC Faraday standing committee on conferences; secretary of RSC/RAS Astrophysical Chemistry interest group; member of RSC Solid Surfaces group committee; RSC Faraday council; external member of the NASA astrophysics grant panel; member of COST action allocation panel; member of EPSRC Chemistry Fellowships interview panel; 'Chemical Cosmos' COST Meeting 2011, Malta (invited speaker), 'Challenges in modeling the reaction chemistry on interstellar dust' 2011, Lorentz Centre, Leiden University (invited speaker), ECOSS-27, 2010, Groningen (invited speaker); Programme Chair for AstroSurf International Vacuum Congress 2013 Paris.

Chen: Veeco Labs Energy Innovation Award 2010; Visiting Fellowship at Fudan University 2012–13.

Cloke: 2012 RSC Sir Geoffrey Wilkinson Award and Prize; 2013 Malcolm Green Lecturer (Oxford); 2013 Timms Lecturer (Bristol); Chair, Royal Society Chemistry and Engineering URF Committee 2010–13; *Organometallics* Advisory Board; Guest editor, *Chemical Communications*; ZING Organometallic Conference 2008, Cancun (Keynote); AGICHEM 2008, Cardiff (Plenary); RSC IRMDG/CCDG 2008, Edinburgh (Plenary); EuCheMS 2010, Nuremberg (Keynote); PacifiChem 2010, Hawaii (invited); SFB-Symposium on Redox-active Metal Complexes 2011, Erlangen (Keynote); 20th EuCheMS Conference on Organometallic Chemistry 2013, St Andrews (RSC Award Winners Symposium).

Crossley: Royal Society URF started October 2008, renewed from October 2013.

Ward: MRC panel member; UK Academic Drug Discovery representative on RSC national panels; ARCADE Chemistry for Health, Athens, 2012 (invited speaker); ACS national meeting, 2012, Philadelphia (invited speaker); Molecular Graphics and Modelling Society, Oxford, 2011 (invited speaker); GluTarget Symposium, Copenhagen, 2009 (Keynote); 3rd RSC BMCS Ion Channel Symposium, Horsham, 2009 (invited speaker); and Programme Chair RSC Symposium on Chemical Biology for Drug Discovery, Macclesfield, 2012.