Environment template (REF5)

Institution: University of Leicester

Unit of assessment: 8 Chemistry

a. Overview

The Department of Chemistry at Leicester is part of the College of Science and Engineering. Since RAE2008, there has been expansion in the total number of staff (from 21.8 to 26.4 academic staff) and increased institutional investments in people, equipment and buildings. The Department now occupies research space in three buildings, all on the main campus: the main George Porter (GP) building houses the teaching facilities alongside offices and the majority of the research laboratories; the new Materials Centre, adjacent to George Porter; and the Henry Wellcome (HW) building which houses specialist facilities for the chemical biology group. There are additionally externally-facing demonstrator units, and business-facing research activities at a fourth location in the G-STEP (GMES Science and Technology Exchange Partnership) facility at Regent Road.

Research is organised in interdisciplinary themes, each with a group leader (bold, below):

- Atmospheric and earth observation science (A&EOS)
- Chemical biology (CB)
- Materials and interfaces (M&I)
- Spectroscopy and dynamics (S&D)
- Sustainable synthesis and catalysis (S&C)

*Atmospheric and earth observation science (Ball, Leigh, **Monks**).*
Research activities are heavily aligned with the wider university Earth Observation Science group and with the College research theme of Environment, Energy and Climate Change. Research activities in chemistry are focused in the areas of air quality (Ball, Leigh, Monks), science and policy (Monks), new instrumentation (Ball, Leigh, Monks), biogeochemistry (Ball, Leigh) and composition-climate interactions (Monks). The group is active in enterprise, with Leigh holding a NERC innovation fellowship and Monks being a founding director of G-STEP (an EO services group). Their work is part of various national centres including the NERC National Centre for Atmospheric Science (NCAS) (Monks) and the National Centre for Earth Observation (NCEO) (Leigh, Monks).

*Chemical biology (Guerreiro, Jamieson, Karim, **Raven**, Piletska, Piletsky, Whitcombe).*
We have invested heavily in Chemical Biology, building on existing strength. The group has been strengthened by new staff and a new research group in biotechnology. Activities are focussed in protein structure, mechanism and design (Raven, Jamieson) and biomimetic design and biotechnology (Jamieson, Piletsky, Whitcombe, Piletska, Karim, Guerreiro) and are closely aligned within the Life Sciences Interface theme of the College. There are strong links with biochemists, cell biologists and cell physiologists in the College of Medicine, Biological Sciences and Psychology, and with the MRC Toxicology Unit, and for this reason some of the research is located in the Henry Wellcome Building.

*Materials and interfaces (**Abbott**, Bond, Hillman, Ryder)*.
The activities of the group focus on: (i) metal processing using ionic liquids - the group has extended its activities to large-scale electrochemical engineering as well as fundamental aspects of the physical chemistry of ionic fluids (with links into Engineering and Geology, through the College Materials and Nanomaterials theme, and to industry); (ii) fundamentals and applications of thin film conducting polymers - with studies on fundamental properties of ion, solvent and charge transport in thin film membranes to develop technologies for charge storage devices, electrochromic displays, electrochemical heavy metal sensors and ion exchange water purification systems. The recruitment of Bond has strengthened the forensic theme.

*Spectroscopy and dynamics (**Ellis**, Evans, Hudson, Yang).*
This research group has built on recognised strengths in gas phase spectroscopy and

molecular dynamics (Ellis, Evans, Hudson) and has now expanded to include a research profile based around helium nanodroplets (Ellis). The group has been strengthened by the appointment of Yang, which has added a new and successful dimension aimed at exploiting helium droplets in novel nanoscience, and Hudson with expertise in biospectroscopy, optical tweezing and microfluidics (with links also into the CB group). It is a cohesive group and works within the framework of the College Research theme (Materials theme): there are strong links with the Condensed Matter group in the Physics and Astronomy Department (von Haeften, Binns) and numerous joint activities in the area of Cluster Science.

*Sustainable synthesis and catalysis (Davies, **Hope**, Solan, Stuart).*
The principal activities of this unit are embedded centrally in the Department as core chemistry research. Synthetic research has been focussed in two areas where Leicester is internationally recognized, both with a sustainability theme. Work on CH activation (Davies, Solan) is focused on mechanistic understanding. Our methodological fluorine chemistry benefits from a combination of organic (Stuart) and inorganic (Hope, Solan) expertise. The group also provides the synthetic input into collaborations with the M&I (Solan with Physics), S&D (Stuart with Hudson) and CB groups (Davies with UBC Canada, Potenza Italy) and the College of Medicine, Biological Sciences and Psychology (Stuart, Davies with cell physiologists).

b. Research strategy

Our over-arching strategy has been straightforward: to create stronger and more focused interdisciplinary research groups, and to improve the research environment and its impact.

(i) Comparison with 2008.
It is important to note that compared to RAE2008 we have increased our standing in national departmental league tables. This has helped us to grow and we have benefitted from significant increased University investment (space, people, equipment) demonstrating institutional support for our development and strategy. We thus enter REF2014 as a larger Department overall than in 2008 (both in terms of student numbers and academic staff numbers), and with a more focussed research agenda. We believe that we enter REF2014 in a considerably stronger position than we did in RAE2008 and that our strategy has addressed the issues which were raised in RAE2008.

(ii) Vision and strategic plans.
Advice from RAE2008 was that the department needed a more coherent research identity, better internal synergies, and to focus on strategic priorities. This defined our strategy for 2008-13, and immediately following RAE2008 we drew up a plan to improve research quality. Our aim was to create stronger, more focused interdisciplinary groups. We have done this by positioning the chemistry research groups (above) within larger research units at University level, nationally and internationally. Our plans were given impetus by institutional restructuring, which placed Chemistry within the new College of Science and Engineering (CSE) ***and*** as the link between the CSE and the College of Medicine, Biological Sciences and Psychology (CMBSP). Raven took the position of Director of Research for CSE (2008-11) and prepared the College research strategy (overseen by the Head of College (Barstow, Physics). Five college research themes were created, three of which directly aligned with Chemistry research groups:

- Environment, Energy and Climate Change (aligned to A&EOS)
- Life Sciences Interface (aligned to CB)
- Materials and Nanomaterials (aligned to M&I and S&D groups)

Chemistry (Raven, Ryder) took the lead in two of the college themes (LSI and M&N, respectively). Direct leadership throughout these top-level changes in research organisation provided Chemistry with the opportunity to expand the scope of our research effort. Internal synergies have been created, our research connects more closely with wider, interdisciplinary frameworks, our research agenda is more transparent at institutional level and, as a consequence, we have benefited from investment channelled through College themes.

RAE 2008 noted that the department had done well in its association with industry in the form of technology transfer, consultancies and spin-out activity. An important part of our research strategy was therefore to build on this, and we created new business-facing demonstrator units and new partnerships with industry through funding from TSB, EU FP6/7, and ERDF.

(iii) Delivery of the vision.
This was planned through the Strategic Research Committee (SRC; Chair Raven); substantive changes were implemented early in the period and departmental funds were used strategically.

Focusing of research activity
- We allocated studentships only to projects which were aligned to the research strategy and primarily on a matching-funds basis (*i.e.* those with matching grant income).
- The College incentivized research, investing >£400k from overheads back to PIs (funds spent on student support or other research activities).
- We established a Department Research Fund, to encourage, for example: conference attendance for staff/students; minor equipment; travel; support for sabbaticals.

Promoting the research agenda and enhancing research visibility
Part of our strategy was to create larger research groups with more visibility and impact.
- The research groups have been given more authority. Equipment, studentships, seminars and conference/travel support is now organized through the groups. In this way, the research groups have more responsibility and this has led to more coordinated/collaborative research activity involving larger numbers of staff.
- In 2008, we introduced individual research interviews and targets for grant income.
- We set up a programme of research sabbaticals which was used by all the groups (9 staff).

Reduction of teaching loads
- We appointed 4 teaching fellows (Frisch, Williams, Smith, Cross) to release research time.
- Teaching loads were increased for 4 staff (Lowe, Rawlings, Handa, Cullis), who continue to make fundamental contributions to the Department but do not now appear in REF2014.
- Research active staff were consequently given lighter or no teaching loads.
- We appointed College-funded graduate training assistants (12 over the period).
- The timetable was adjusted, to concentrate teaching in more intensive periods.

(iv) Evidence for success of the strategy. The benefits of these changes continue to feed through, and we are seeing visible improvement in the overall research environment:
- A 20% increase in staff numbers;
- A growth in the research studentships (see Table on p6);
- Recruitment of a group of five new staff into the Chemical Biology group;
- The acquisition a new research building for the M&I and S&D groups;
- Institutional investment in equipment (*ca* £2M) and infrastructure (£5.8M);
- 3 College lectureships created in climate change/atmospheric chemistry; one of these (Leigh) is in Chemistry, the other two are part of the same research effort (in Physics/Geography).
- Average research income per annum rose from £1.3m in RAE2008 to almost £2.1m in REF. Total research grant awards in the REF period were £10,753,000.
- The A&EOS group, in collaboration with the College EE&CC theme, has successfully bid for a new NERC DTP (CENTA DTP, partnership with Warwick, Birmingham, Loughborough, OU, CEH and BGS, over 5 years).
- The M&I Group is a partner in the newly announced EPSRC CDT in Innovative Metal Processing, led by Leicester in collaboration with Nottingham and Birmingham (with input from companies such as Alstom, Rolls Royce and Doncasters Group).
- Foundation of three business-facing outreach facilities (Ionic Liquids Demonstrator Units (ILD), Real-Time Air Fingerprinting Technology (RAFT), and G-STEP.
- New interdisciplinary (Chemistry, Physics & Cardiovascular Science) collaboration to create a £0.5M Diagnostics Development Unit in A&E at Leicester Royal Infirmary.

(v) Future plans. We are in the process of setting up an external advisory group, with a remit to

review the research activity, which will help to guide our strategy from 2014. The focus will be on: (i) improving research culture and environment, (ii) increasing the quality and number of our impact case studies, and (iii) building on our work in terms of business engagement. There will be further focussing of research resource and teaching allocations following 2014 onwards.

The ability of the department to expand had been limited by physical constraints of the estate. The new Materials Centre is allowing a reconfiguration of the main chemistry building and through this expansion we can grow the research effort further. A direct consequence of the reconfiguration/reallocations of teaching duties (section iii/3 above) is that we now have capacity to achieve this.

c. People, including:

The policy for staff development is always to encourage the highest level of research quality in young staff and to nurture them through to Chair. We point to the senior staff in our submission as evidence of our success, as *ca* 90% of our Chairs started their careers at Leicester.

i. Staffing strategy and staff development

Strategy in relation to research. All new appointments to academic posts are made with reference to our research groups (section b), and are approved at College level. Each appointment requires a business case to the College, and an explanation of the research justification. During the period, we have hired 9 new staff (Jamieson, Hudson, Bond and Leigh, plus the research unit of Piletsky, Piletska, Whitcombe, Karim and Guerreiro from Cranfield University). These appointments directly connect with the research strategy outlined above, and have increased the critical mass and effectiveness of three of the research groups.

Career development support. We have well-established mechanisms for supporting staff at all stages of their career. From the cohort of staff who were eligible for promotion since 2008 (*i.e.* those who were not chair in 2008), we have successfully promoted >50% to either chair (Davies, Ellis, Ryder), or Senior Lecturer (Ball, Evans, Solan, Stuart and Yang). Two fellowship holders have been promoted to senior lectureships (Stuart and Yang).

Beyond promotion, the Department runs both formal appraisal (through Staff Development) as well as research interviews for staff, the latter addressing research direction (3-5 years), grant targets, publication profile, conferences, new collaborations. We operate a workload model which minimizes teaching loads for our most research active staff and those with heavy research workloads outside of the Department, and aims to balance teaching and admin workloads for all other staff (see also section b above).

We direct as much resource/support as possible to recently appointed staff. Aside from the up-front support (PhD studentships, less than 50 % of a normal teaching load for 3 years, and ability to draw on the SRC research fund for conferences and minor equipment), career development for research within the Department is also supported by the annual appraisal programme and encouragement to engage in the comprehensive range of career development training courses available within the College and the University. Continuing this, the Department has introduced a formal process for helping both internal and external candidates develop their applications for independent university research fellowships. This approach was subsequently adopted as a College-wide scheme. As part of the Athena Swan work, below, we provide specific mentoring for staff who have taken career breaks; such staff also have reduced teaching loads.

Arising from our Athena Swan work early career researchers from Chemistry have established a College-wide network for postdoctoral research workers within the Institution aimed at supporting their career development, and within the Department we provide careers interviews for PDRAs and other early career workers.

Implementation of the Concordat to support career development. The University is a signatory to the Concordat to Support the Career Development of Researchers, and has been awarded the *HR Excellence in Research Award* from the European Commission. The Award acknowledges the University's alignment with the European Charter for Researchers and Code of Conduct for their Recruitment. The Concordat Action Plan 2011-13 examines where Leicester is in line with, or goes beyond, the requirements under the six principles of the Concordat. Areas for further work have been identified and are being monitored by the Concordat Steering Group chaired by the PVC Research and Enterprise. The principles of the Concordat are actively promoted and supported by the Chemistry Department. Early career researchers and new staff in Chemistry are assigned a mentor to help develop their careers in terms of understanding and exploiting the University systems, raising external support for their research and developing their national and international reputations. The College has a voluntary scheme where established staff can opt for a mentor for career development.

Information on staff with fellowships. A total of *ca* 30% of the staff in this submission held research fellowships during the period; all fellowships listed below.

Ryder: Royal Society Industry Fellowship (2010-12); **Hudson:** EPSRC Advanced Fellow (2005-10); **Raven:** BBSRC FLIP research fellowship (2013-15); **Stuart:** Royal Society URF (3 year renewal 2006-10); **Yang:** EPSRC Advanced Research Fellowship (2006-11); **Davies:** Leverhulme Study Abroad fellowship (2011-12); **Leigh:** NERC Innovation Fellow (2009-2013); **Su:** EPSRC Research Fellow (2009-12); **Liu:** Daphne Jackson Fellowship (2013-15); **Frisch:** both DAAD and Leverhulme Fellowships (2007-08, then to Freiberg University); **Burley:** EPSRC Advanced Research Fellowship (2007-12, then to Strathclyde); **Lovett** was awarded a URF at Leicester, but moved the award to Edinburgh.

Support for equalities and diversity. The University is proud of its reputation and achievements in the area of equality and diversity; the city is renowned for the harmony of its ethnic diversity and accordingly the University is inclusive and helpful for all-comers. The Department has been a leading player at University level, as **Cullis** chairs the University's Athena SWAN Self-Assessment Group and the College's Equal Opportunities Committee, and he wrote the successful Institutional Bronze Award submission (2008) and its renewal (2011). The Chemistry Department was awarded an Athena Swan Bronze Award in September 2013. Equality and diversity have been headlined as one of several top-line priorities for the Department, with the target being an application for silver in 2014/5. **Raven** is a member of the Daphne Jackson Trust fellowship awarding panel; Cullis chairs the University's Daphne Jackson Working Group. The Department currently hosts one Daphne-Jackson fellow.

ii. Research students

Recruitment. We operate a central process for PGR admissions, with an Admissions Tutor (Hope) and dedicated secretarial support. The Department only accepts students educated to Masters level onto its PhD program. The number of PGR students has risen over the REF period, see table below. Within this expansion we have also witnessed an increase in the number of overseas PhD students, through initial recruitment onto the new MSc programs that we have set up (MSc Tutor: Hope) which creates in effect a 1+3 PG program.

Training and support. All PhD students are part of the University Graduate School, which provides support to research students across the University's four Colleges. The training programme operates at two levels: at Department level and at College level. In addition to this, there is also a central, university-level training program which all students must attend which provides a complete skills and career development program and includes a variety of courses under three main themes: *Managing your Research*, *Communicating your Research* and *Employability and Career Management***.** At Departmental level, students undertake specific training to support their research, including taught modules. Most of the training programmes available to early careers researchers (*e.g.* Intrepid Researcher, Enterprising Researcher, Skills for the Professional Researcher *etc*) are also available to PGR students.

Monitoring. The University has recently implemented improved procedures for monitoring and assessment of postgraduate students. All new postgraduates now have allocated an academic supervision panel and a progression panel. The latter is explicitly formulated to provide autonomous assessment of the student progress as well as independent support and advice. At the end of year 1 of a PhD programme the panels meet to determine progress and assess progression (probation). The panels continue to deliver assessment and feedback throughout the postgraduate programme. In addition, research students are given a flexible but prescriptive programme of taught courses; some of these are related to the project and others are focused on transferable skills including career progression and communication. Some taught elements are mandatory across the Department and College, whilst the PhD student has the option to choose, in consultation with the supervision panel, other relevant modules.

Student populations. We were asked to provide information on student populations. The graduate school has increased by *ca* 50% over the period as in the following table.

Years	2008/09	2009/10	2010/11	2011/12	2012/13
Total FTE enrolled	34	42	41	46	47
Students enrolled year1	11	15	15	14	17

d. Income, infrastructure and facilities

(i) Evidence of investments in infrastructure and facilities - current. In the previous RAE2008 period, the Department contracted in size and estate, and (as noted in RAE2008 feedback) there was low institutional investment. This has changed post-2008 and the College framework allowed expansion and investment into larger research themes that had not been possible previously. These changes make the Department a larger and more vibrant place.

A substantial investment is the provision of space in a new research building – the Materials Centre (completed October 2013), housing 4 chemistry staff in the M&I group (Abbott, Bond, Ryder, Hillman) plus their research groups (there is one member of staff from Engineering also in the Materials Centre, reflecting the links to the CSE Materials and Nanomaterials Theme). The Materials Centre is located directly adjacent to the George Porter Building and its refurbishment (budget for refurbishment and associated instrumentation: £0.35M) provides an extra 1000 m^2 of new research and office space over two floors (9 offices, 1 meeting room, 17 individual research labs/instrument rooms, 1 write up area). There is laboratory and write up space provided also for both the S&D and A&EOS research groups. This equates to a 25% increase in our research space. The building houses demonstrator units for Ionic Liquids, Biopolymers and Forensic Science. The space in George Porter vacated by the move to the Materials Centre has been refurbished to accommodate the Biotechnology group (Piletsky, Piletska, Whitcombe, Karim, Guerreiro) at a total cost of £200k on equipment/refurbishment.

Other investments have been around enterprise activities and business-facing Demonstrator Units. Initial investment (£200k) was secured to house the G-STEP research operation (see Impact Statements) on the main campus, providing refurbished space (150 m^2) suitable for business interface (boardroom, customised reception and office space). In addition, the Real-Time Air Fingerprinting Technology (RAFT, £340k, 60 m^2), GMES Science and Technology Exchange Partnership (G-STEP, £2.8M, 150 m^2) and Ionic Liquid (ILD, £125 k, 155 m^2) demonstrator units were obtained using ERDF, and required University investment of £800k. We also have a new demonstrator unit (IRSA) which is chemistry-led initiative (Monks) to drive SME-led growth by using university R&D (£960k investment; 50% from ERDF and 50% from University (through staff match to pay for innovation fellows).

In terms of equipment, CIF funding in 2008 funded two university-wide investments in mass spectrometry (£1.1M), which placed a new LC-MS (*ca* £250k) directly into Chemistry (through the CB group), and in analytical instrumentation (£1.1M, led by Chemistry), *ca* £600k of which purchased numerous instruments including XPS, a digital holographic microscope and optical

parametric oscillator (laser) directly for chemistry research (led by the S&D group). There was also a large (£0.5M) equipment investment in a Point of Care Diagnostics Development Unit, which is a collaboration between the A&EOS group and the College of Medicine, Biological Sciences and Psychology (with links to the hospital and the Space Research Centre in Physics). There were smaller investments into single molecule work (£350k, CB group (Hudson)) and materials analysis (£250k, M&I group).

The University has established a Research Infrastructure Fund. Chemistry led the following bids (total *ca* £1.2M directly into Chemistry): £183k to CB group for combinatorial synthesis/screening; £121k to M&I group for FTIR imaging; £203k to S&D group for high transmission/high resolution mass spectrometry; £71k to the M&I group for a 3D optical profiling microscope; £56k to the S&D Group for customized equipment for microfluidics; £23k to CB group for a DNA synthesizer; £322k for an XPS facility; £121k to M&I group for a thermal analysis suite; and £96k to M&I group for an Imaging System for Forensic & Surface Analytical Research. Through the College research themes, Chemistry were additionally partners on bids >£0.6M: £78k for surface science analytical instrument (M&I group), £380k for an ICP-MS (CB and M&I group); £167k for a labchip reader and £14k for mass spectrometry (CB group).

The University has invested heavily in IT research infrastructure, with emphasis on supporting research effort in CSE. The University purchased (£2.2M in 2010) High Performance Computing hardware, which is now being upgraded (£100k). In 2012 there were further investments in Chemistry with £50k for a Windows 7 migration and £500k for a research drive for storage of large amounts (Tb) of data centrally.

(ii) Future investments in infrastructure and facilities. Our financial position within the institution, coupled with buoyant undergraduate recruitment means that we are in a position to further plan for improvements in our research environment.

- The university is aware of the age and limitations of the George Porter building, and we are working to prepare a business case for a new chemistry building (3-5 years).
- We have a phased plan for continued investment in major equipment (NMR. MS, XRD).
- The new Materials Centre allows us to explore plans to create an adjacent user area for major infrastructure, to house all the 'core' research instrumentation (XRD, NMR, MS).
- Other short term plans are phased and include: (i) creation of a new chemistry laboratory in the George Porter building (73 m^2, estimated costs for installation, refurbishment, fitting = £72k) for October 2014; and (ii) refurbishment of the teaching laboratory for October 2015.

(iii) Research funding - future plans. Future objectives for research strategy (see section b (v)) and infrastructure (see section d (ii)) are explained above.

We will continue to aim for larger, collaborative grants. Building on our successful bid for a NERC DTP, we intend to plan for further CDT/DTP bids: these will be led through the research groups at Departmental and College level, and we have developing plans with partner institutions in the chemical biology and materials areas. A major department theme from Oct 2013 is to further increase the number of PGR students, and there will be further re-alignment of teaching/admin responsibilities to create time for this.

Future research plans through the groups include: the development of a Nanolab (S&D group), new activities in the area of metal-regulated circadian and ion channel control (CB group); major new work on unconventional energy (*e.g.* fracking and biofuels, A&EOS group), a new project on green methods of collagen processing (M&I group). As part of the M&I theme, the newly-created Alec Jeffreys Forensic Science Institute (AJFSI), includes representation from Chemistry, Genetics, Engineering, Law, Criminology, Archaeology and Pathology: its focus is on promoting interdisciplinary research and interactions with external agencies (*e.g.* the Technology Strategy Board) and practitioners.

e. Collaboration and contribution to the discipline or research base

(i) Exemplars of research collaborations, interdisciplinary work and enterprise. It should be evident from the above sections, that our research has been aligned to span different disciplines, and this has enabled us to align our work within a wider College research framework. In terms of enterprise, we have explained above the creation of demonstrator units and business-facing research activities in the Materials Centre and at G-STEP.

(ii) Exemplars of leadership. Our strategy has been to build a more outward looking attitude. Below are the most significant activities. Staff have been recipients of numerous fellowships/prizes, contribute to numerous journals (editor, editorial board), are involved in RSC activities, are giving regular talks, and are involved in policy making at government level. We believe that this addresses previous RAE feedback that the department needed to do more in terms of engagement with government and society.

A&EOS group: **Monks:** NERC Council (Government appointment) (2011-) and audit committee (2012-); Chair of IGBP-IGAC; Chair of Air Quality Expert Group (Defra, Government appointment); Attend Chairs of Science Advisory Committee (Chair: John Beddington/Mark Walport, GCS); Space Leadership Council; Commission for Atmospheric Chemistry and Global Pollution; TSB Sat Apps Catapult Advisory Group (2012-); Chair of IGBP UK National Committee (Royal Society) (2012-); Lead for DG-RES EU Air Quality Policy research review for ozone (2011-2012). **Ball:** Committee, Environmental Chemistry Group RSC (2008-present); Convener for ECG's Atmos. & Env. Chem. Forum for early career researchers (2009/10/12).

CB group: **Guerreiro:** RS Brian Mercer Feasibility Award (2011-12); **Karim:** Visiting Professor of Hengyang Normal University, China. **Jamieson:** SCI Young Chemists Panel; RSC Bio-organic Group Committee. **Piletsky:** Visiting Professor in Jinan and Huazhong Universities; Vice-President and General Secretary of International Union of Advanced Materials. **Raven:** BBSRC fellowship (2013-15); FRSC (2010); RSC Inorganic Reaction Mechanism Award (2008); Chair, IBDG (2009-); RSC council (2011-14); ERC Advanced Grants panel (2011-15), BBSRC Panel D (2009-2011) and BCB panels (2008). **Whitcombe:** President of Society for Molecular Imprinting (2012-); Adjunct Professor, Jiangsu University, Zhenjiang, China (2013-).

M&I group: **Abbott:** Chair of RSC Molten Salt Discussion Group; RSC Industrial Chemistry Medal & Lectureship (2008); RS Brian Mercer Award (2013); Chair, EPSRC CDT panel (2013). **Bond:** OBE (2011); BBC Focus Magazine Award - invention most likely to change the world (2009); Time Magazine Award - top 50 inventions (2008); Advisory Board, California State University, Justice Studies Department (2009). **Hillman:** President Elect, President and Past President, International Society of Electrochemistry; Faraday Division awards committee (2011-2012); Editor (2012) and editor-in-Chief (elected 2013), *Electrochimica Acta*. **Ryder:** RS Industry fellowship; Institute of Materials Finishing Award: Canning Bi-Centenary Medal (2013).

S&D group: **Ellis:** Chair RSC Spectroscopy and Dynamics group (2012-2014); Member, IoP Molecular Physics Group (2012-2015); Fellowship of the Institute of Physics (2012 -); visiting Professor, University of Innsbruck (2011). **Yang:** EPSRC Advanced Research Fellow (2006-2011); Member of RSC Spectroscopy and Dynamics Group. **Hudson:** EPSRC Advanced Fellowship (2005-2010); Steering committee for EPSRC "Laser Loan Pool Facility" at the CLF, *Rutherford Appleton Laboratories; visiting Professor, Monash University (2013-14).*

S&C group: **Davies:** RSC Dalton Council (2005-8); EPSRC grant panels (2005, 2009); visiting lecturer UBC Vancouver (2010; 2011/12). **Hope:** Chair EPSRC Fellowships panel (2008/9, 2010/11); Member EPSRC New Directions Panel (2013); Member SusChem UK Advisory Group (2006-); International Advisory Board ISOFT (2010-). **Stuart:** RS URF (2000–10); member of RSC Fluorine Subject Group steering group (2007-).