Institution: Queen Mary University of London (QMUL)

Unit of Assessment: Main Committee B, sub-panel B8 (Chemistry)

a. Overview

Staff submitted to UoA8 are located within the School of Biological and Chemical Sciences (SBCS) that forms part of the Faculty of Science and Engineering at QMUL. SBCS was created in 2006 by a merger of the former Schools of Biological Sciences and Chemistry, allowing the re-launch of QMUL Chemistry within the context and support provided by a larger School, as a strategic priority aligning to national recognition of the importance of chemistry for the UK economy. The decision to create SBCS allowed the School to revive undergraduate recruitment in its Chemistry programmes and created an exciting opportunity for recruitment of new staff in Chemistry. Restructuring of SBCS in 2011-2012 focused its activities around its research strengths in four divisions: Chemistry & Biochemistry, Cell & Molecular Biology, Organismal Biology and Psychology. Staff submitted to sub-panel B8 form a sub-set of Chemistry & Biochemistry division, with other staff in the Division submitted to UoA5 (Biological Sciences) and UoA13 (Materials). In Chemistry, clusters of research excellence were identified in Synthesis & Catalysis and Physical & Theoretical Chemistry, forming the basis of ongoing recruitment and infrastructure investment. Restructuring was combined with the recruitment of new staff active in research to all four divisions of SBCS. Major investment in new staff has resulted in the recruitment during the REF period of 8 new staff in the Chemistry area (**Chass**, **Delgado**, **Goldup**, **Jones**, **Milanesi**, **Palma**, **Roessler** and **di Tommaso**). **Goldup,** currently a Senior Lecturer, was initially appointed as a Leverhulme Trust Early Career Fellow and now holds a Royal Society University Research Fellowship (2009-17). In addition, two senior appointments during this period, the College's Principal (**Gaskell**) and Vice-Principal for Science and Engineering (**Kilburn**) are both research-active chemists. We will continue investment in Chemistry with two further posts planned for the next year.

Investment in new staff is combined with major investment in SBCS research infrastructure (see Section d.), aimed at developing world-class space and facilities for each of our areas of research excellence. In parallel with the strengthening of our research activities, teaching has been streamlined, with the appointment of six Teaching & Scholarship staff in Chemistry to take on some of the major teaching and administrative roles, thus ensuring sufficient research time for research-active staff. Maintaining the four divisions within the same School promotes distinctive areas of interdisciplinary research, with notable potential at the Chemistry:Biology interface. To this end the recent appointments of **Milanesi**, **Palma** and **Roessler** to lectureships in Chemistry underpin our strategy due to their exciting work on the chemistry of biologically-relevant molecules and structures. Other new appointments in SBCS (submitted to UoA5) are also close to the Chemistry:Biology interface. Building around our areas of strength also achieves alignment with the priorities of Research Councils and other funding bodies, thereby enhancing sustainability.

At RAE2008 it was decided to return the Chemistry staff under two UoAs, namely UoA14 Biological Sciences and UoA29 Metallurgy and Materials. As a result of the major growth and investment in QMUL Chemistry during the REF period and the collective desire to be externally recognised as a research active centre for Chemistry in the wider scientific community, we are returning a Chemistry submission to REF2014.

b. Research strategy

Achievement of strategic aims

During the REF period our aim was to grow research in Chemistry and make a REF2014 return. It was also to identify existing strengths where resources could be successfully targeted. We have successfully recruited to these areas and have plans to grow them further. Success is evidenced by increased income, outputs, and the increasing size of the PhD cohort.

Overview of research plans

Our research strategy in Chemistry is predicated by the need to nurture and support the relatively young research active chemists and to grow the division to approximately 20 research-active academic staff in the next 2-3 years. Our plans in the current REF period, and beyond, focus on building around areas of excellence in Synthesis & Catalysis and Physical & Theoretical Chemistry and building our distinctive strengths at the Chemistry:Biology interface, taking advantage of the opportunities offered by QMUL Chemistry's location within a larger School of Biological & Chemical Sciences. Activities and plans for these areas are detailed below. Our goal is to provide outstanding facilities, strong leadership and a working environment that will attract the best researchers from around the world. There is clear evidence that this strategy is working judging by

the quality of new appointments and the fellowships won by existing staff.

Mechanisms for promoting research

The SBCS Research Strategy Group (RSG) provides a forum for developing new research initiatives, especially cross-disciplinary consortium grant applications and significant infrastructure and equipment bids. RSG is chaired by the Director of Research and its membership includes the Head of School, Heads of Division, Director of Industrial Innovation, as well as elected representatives from the academic staff, postdoctoral and postgraduate communities. RSG's remit is to maintain and enhance a stimulating environment for research, to identify strategic hires of staff and to increase the School's research resources, in terms of equipment, research staff and postgraduate students. It oversees research mentoring (including mentoring for PDRAs), the internal peer-reviewing of grant applications, allocation of research studentships and allocation of awards from a School 'Pump Priming Fund' (£50k p.a.) and "Continuation funding", where modest additional resources can enable high quality publications. Peer review of all grant applications exceeding £50k enhances success rates and spreads best practice. RSG forged a link with Innovayt, a consultancy that facilitates applications for EU funding, resulting in the successful award of a Marie Curie Initial Training Network (ITN) grant. This link has now been adopted by the Faculty. Annual research away days serve as a wider forum in which all academic staff can participate. The School employs a Research Services Manager who gives targeted grant information to staff and provides support for grant applications and grant management. SBCS has adopted a formal process by which time committed to research projects and students, as well as time for community research-related tasks, can be explicitly traded off against teaching and administrative roles through a workload model. For example, credit on the workload model is given for the preparation of grant applications, running research grants, editorships of journals and membership of grant awarding committees. We see this as essential to ensure that the time and energy required to develop new research directions and impact are not precluded by routine teaching and administrative tasks.

Research in Chemistry at QMUL - current activities and development plans

Synthesis and Catalysis is already an area of strength with the established staff members including **Bray**, **Goldup**, **Kilburn**, **Larrosa** and **Watkinson** now joined by **Delgado**, **Jones**, **Milanesi** and **Palma**. We have internationally leading outputs in catalytic C-H activation (**Larrosa**, e.g. J. Am. Chem. Soc. 2008, cited 198 times to date), molecularly imprinted nanogels and drug delivery systems (Prof Marina Resmini, submitted to UoA13), molecular machines (**Goldup,** e.g. Science 2013, cited 23 times), novel electrochemical methodology (**Kilburn**, J. Am. Chem. Soc. 2012) and small molecule sensors (**Watkinson**, Inorg. Chem. 2009, cited 79 times). Research from the Synthesis and Catalysis area of the Division's activity also underpins the spinout companies PhosphonicS (Prof Alice Sullivan) and Degrasense (**Watkinson**). **Jones** is set to develop new applications of benzyne chemistry towards the synthesis of aromatic heterocycles. **Milanesi** will build on her excellent work on protein folding and lipid bilayer structure and behaviour (e.g. PNAS 2012, Nature Chem. 2010), while **Palma** will develop his exciting work on biomolecular nanoarrays (J. Am. Chem. Soc. 2011), providing further bridges to both Materials and Structural Biology at QMUL. We will develop this unit through investment in new staff to build critical mass in this exciting research area.

Physical & Theoretical Chemistry is a second thematic area that builds on existing strengths. Here we already have international leaders in electron transfer (**Vlcek**, e.g. Science 2008, cited 147 times), neutron and muon spectroscopies underpinned by theory (**Chass**, e.g. Chem. Eur. J. 2009) as well as mass-spectrometry (**Gaskell** e.g. J. Proteome Res. 2009, cited 86 times). New recruits in this area are **Roessler**, using Electron Paramagnetic Resonance spectroscopy to probe biological electron transfer reactions (e.g. PNAS 2010), and providing a bridge to the SBCS bioenergeticists and structural biologists, and **di Tommaso**, who uses quantum chemistry for dynamic modelling of materials (eg Inorg. Chem. 2008). With **Chass** and **di Tommaso,** together with Dr Chris Duffy in the Cell & Molecular Biology Division we are building critical mass in Theoretical and Computational Chemistry, and we will be recruiting more research leaders to further strengthen this area.

Staff from both Chemistry groupings contribute to the links with SBCS Biologists, taking full advantage of QMUL Chemistry's position within a larger School of Biological and Chemical Sciences. To give just a few examples: expertise in the Organismal Biology division in zebrafish

(*Danio rerio*) as an animal model has been used to develop methods to monitor zinc levels *in vivo* (**Watkinson**, Chem. Commun. 2011) and the toxicity of nanoparticles (Prof Marina Resmini); **Bray** contributes his expertise in organic synthesis (e.g. Chem. Commun. 2010) to a Pre-Clinical Drug Discovery Group to which QMUL biologists bring their expertise in bacteria and trypanosomes; **Roessler**'s EPR studies on electron transfer in biological molecules (PNAS 2010) have direct relevance to the strong Structural Biology & Photosynthesis group, as does **Vlcek**'s expertise on photochemistry and electron transfer, including biological molecules (e.g. Science, 2008); **Milanesi**'s work on imaging membrane disruption by amyloid fibrils (PNAS 2012) directly complements the work of Dr John Viles on amyloid fibril structure; **Milanesi**'s work on lipid membrane function (Nature Chem. 2010) will strengthen the interests in the Structural Biology & Photosynthesis grouping on biological membranes (e.g. Plant Cell 23 (2011) 1468).

Beyond SBCS, the College has a stated aim of supporting interdisciplinary research in Materials and at the Life Sciences interface, underpinned by the launch in 2013 of the QMUL Materials Research Institute, and the new Life Sciences Institute, projected to begin operations in 2017/18. The College already offers PhD studentships and pump-priming investment specifically to support both areas of interdisciplinary activity. The research strategy for Chemistry aims to complement this broader College strategy. A number of collaborations already exist between Chemistry staff and academics from other Schools in the Science & Engineering Faculty as well as the School of Medicine & Dentistry which provide good foundations to develop research synergies further e.g. **Goldup** and **Larrosa** with Dr Steve Dunn (Engineering & Materials Science), **Watkinson** and Dr Steffi Krause (Engineering & Materials Science), **Chass** and Prof Martin Dove (Physics & Astronomy).

Since its near-closure in 2003 Chemistry in QM has come a long way. The next period of time is exciting for this unit. We intend to apply for RSC accreditation of the undergraduate degree programmes in Chemistry which will help maintain the sustainability of the teaching portfolio and the budget. In 2013-14 we recruited a record 135 students to Chemistry programmes. We can build on our strong links with biology, medicine and materials to develop a distinctive chemistry brand at Queen Mary. We will continue to invest in our strengths in Synthesis & Catalysis and at the interface between Chemistry and Biology. We will engage with partners in collaborative ventures across London and elsewhere to provide access to equipment and facilities that are too expensive to build and maintain in a single institution (for example a new partnership with UCL for EPSRC-funded chemistry infrastructure equipment).

c. People: i. Staffing strategy and staff development

Staffing strategy

Our recruitment strategy is based around the development of distinctive clusters of research excellence in the School. Recruitment of new staff (and associated investment in start-up funds) helps to strengthen our areas of research excellence, while the existing staff in these areas help to provide a productive and supportive environment for the new recruits. New academic staff recruited during the REF period include **Delgado**, **Goldup**, **Jones**, **Milanesi** and **Palma** to the Synthesis & Catalysis group and **Chass**, **Roessler** and **di Tommaso** to the Physical & Theoretical group. **Goldup, Milanesi, Roessler** and **Palma** will also further strengthen research at the Chemistry:Biology interface. Other staff recruited within the School are relevant to the Chemistry research strengths, including Dr Chris Duffy (quantum chemistry for molecular modelling of biomolecules). **Palma** (USA), **Chass** (Canada) and **Delgado** (Spain) are outstanding international appointments during the REF period.

Probation for newly-appointed academic staff

The standard probation period is three years, during which new staff are set three key targets: to apply for at least one project grant per year, and normally be awarded one project grant or the equivalent within 3 years; to publish as first or corresponding author at least 3 papers in top journals in the subject area and to complete the Postgraduate Certificate in Academic Practice. Probationers are allocated a Probationary Advisor who meets with the probationer approximately every 3 months and who acts as a mentor to them. They also receive advice and support for research funding applications (which must be internally peer-reviewed before submission) and with manuscripts and responses to reviewers. Historically they have received modest start-up funding (typically £15k – £20k) but also free access to SBCS facilities and technical support whilst establishing their own funding. Start-up funds since restructuring in 2011-12 are far more generous, with the result that average start-up funds allocated during the REF period are ~£150k

each for new staff in Chemistry. In addition, new staff are now awarded a research studentship to start as soon as feasible after arriving at QMUL. Initial teaching loads are light (about 10 lectures in the first year, building up to a full load of ~30 lectures with associated labs and workshops by the third year). Probationers are not allocated significant administrative duties. Within the REF period all new chemistry academics successfully completed probation with all eligible staff securing their EPSRC First Grant (**Larrosa**, **Bray** and **Goldup**).

Mentoring and support for academic staff other than probationers

Academic staff are line-managed by their Head of Division or deputy. Established staff are assigned on request a research mentor who provides advice and support funding applications and publications. In addition, all grant applications valued above £50k are subject to a formal internal peer-review procedure with the aim of enhancing their quality. The appraisal system has been updated in the last year, with an annual meeting to formally compare performance against the targets that were set the previous year. During appraisal, all staff can request specific support for training, equipment or resources that will facilitate their work in the next year. The appraiser and appraisee meet on at least 3 other occasions during the year to review activities and ascertain in-year progress and development.

Support for research fellows

Research Fellows receive the same mentoring support as probationers. All postdoctoral researchers are offered the possibility to have a mentor, assigned from within the School, whose main task is to support the fellows in securing their career choices. Mentoring and peer review of fellowship applications has contributed to considerable success for the School in these schemes (during the REF period **Goldup** has held a Leverhulme Trust Early-Career Fellowship followed by a Royal Society University Research Fellowship and there have been 5 Marie Curie Fellowships hosted by QMUL Chemists). In addition, **Jones** holds a Ramsay Memorial Fellowship (2013-15) and **di Tommaso** holds a Royal Society Industry Fellowship in partnership with AstraZeneca (2011-15). QMUL support for PDRAs includes a Science & Engineering Postdoc Network (established as part of the College's Concordat Implementation Plan which has secured the EU Commission's "HR Excellence in Research" Award 2012) which was led by Dr Thomas Ings (an SBCS Leverhulme Early-Career Fellow who moved to a Senior Lectureship at Anglia Ruskin University). The network runs events such as Postdoc Forums and Grant-Funding Masterclasses.

Equal Opportunities

SBCS strives for equal opportunities in all its appointments and treatment of staff. In September 2013 SBCS was awarded a coveted Athena SWAN Silver Award for excellence in recruiting and advancing the careers of women in science, engineering and technology (SET), marking the progress made in equal opportunities during the REF period (see Athena SWAN web-pages http://www.sbcs.qmul.ac.uk/79202.html). Since creation of the four new divisions in 2011, 40% (2 out of 5) of T&R appointments in Chemistry have been female (**Milanesi** & **Roessler**). More female staff are being encouraged to come forward for promotion and promotions are occurring, including Dr Marina Resmini to Professor in 2013. We are supporting our female staff with 1 year PDRA support around periods of maternity leave and are planning a number of beacon activities in our quest for the Gold Athena SWAN Award. Staff in SBCS have contributed to the successful College bid for Athena SWAN bronze, and act as School champions in the current College application for renewal. In addition, SBCS supported and encouraged the establishment of Women in Science and Engineering (WISE) at QMUL, which has been led by several of our research students (http://wiseqmul.wordpress.com/).

c. People: ii. Research students

Development of a research culture

Research student recruitment, supervision and progression is overseen by the Director of Graduate Studies. PGR students are a critical part of the School's research culture. They are integrated into research themes, participate in research events and are represented on the SBCS Research Strategy Group. The excellence of our PGR students is evidenced by their high completion rates (detailed below).

SBCS promotes the involvement of research students in the wider research culture through seminars and symposia:

a.) SBCS hosts research seminars by distinguished visiting speakers (e.g. recently Chris Hunter, FRS; Fraser Armstrong, FRS, Donna Blackmond, Ben Feringa, Chris Dobson FRS, David Barford FRS, Sheena Radford, Ben Davis, Nick Barton FRS, Lorna Castleton FRS, Carol Robinson FRS)

and research students are encouraged to attend these seminars and to interact with the speakers; b.) Specialist research mini-symposia c.) An annual Postgraduate symposium, with talks by third-year research students and poster presentations by second-year students. d.) Research techniques in Biomedical & Life Sciences, a monthly series of afternoon training sessions run by SBCS staff in collaboration with Medicine & Dentistry which provides PhD students and PDRAs with opportunities to learn about the wide range of research techniques that are used by life sciences researchers throughout the College e.) specialist weekly meetings at which post grads and post docs present a recent publication or research idea. At College level, the recently-established Queen Mary Doctoral College provides the focal point for supporting doctoral and postdoctoral researchers at QMUL, with 4 members of staff dedicated to researcher development, while the QMUL Centre for Academic and Professional Development provides a full programme of transferable skills training including careers advice. A points-based training system supports delivery of QMUL's PGR training strategy, based on the RCUK-endorsed Vitae Researcher Development Framework. Science Communication training includes "Junk the Jargon", a College-wide competition where PhD students present their work to a public audience.

Research student recruitment

We operate a competitive allocation process where the strength of the applicant is a key factor in determining which projects are supported. All short-listed applicants must be interviewed by at least two members of academic staff, one of whom is a senior member of staff who has no involvement in the project. Staff are required to record reasons for accepting and rejecting applicants for PhD positions and these recommendations are approved and signed off by the Director of Graduate Studies. SBCS Chemistry research students are supported by studentships from EPSRC (37% of the total starting in the REF period), by School and College funding (mainly competitive College-Funded studentships - 25%) and by other bodies including the EU (14%) and China Scholarship Council (14%). SBCS is involved in 4 Marie Curie ITNs (2 coordinated by SBCS staff, of which one is in the Chemistry/Materials area). Of the cohorts starting from 2010/11 to 2012/13, 50% are female. 53% are UK nationals, 35% EU and 12% overseas. 8% were aged 31+ at registration with an overall average age of 26.

Total numbers of Chemistry research students enrolled by academic year

Academic year	**2008-09**	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**2013-14**
Chemistry PGRs	**14**	**19**	**19**	**30**	**34**	**36**

Research student progression and submission rates

All PhD students have a supervisory panel comprising an experienced Chair, a second member and their supervisor. Panel meetings are held at 3, 7, 24, 30 and 36 months with a formal progression point at 9 months. The focus of the 30 and 36 month panel meetings is to ensure timely submission of the thesis. Of the cohorts starting Chemistry PhDs between 2008/09 and 2012/13, 87% (34/39) passed the progression hurdle. Of students registered for Chemistry PhDs and due to complete from 2008–13, 93% (14/15) submitted PhD theses within the 4-year deadline.

Procedures to stimulate and facilitate exchanges between academia and business

SBCS is supportive of CASE studentships and gives them high priority, to encourage exchange between our academic staff and industry. Staff have been very successful in attaining CASE support from the Pharmaceutical and Agrochemical Industries. CASE collaborations include **Larrosa** (Pfizer), **Larrosa** and **Bray** (both with Syngenta) and Dobbs (AstraZeneca x2). Other collaborations with industry to support PhD studentships include **Watkinson** (Warwick International), Dr Ali Zarbakhsh (BP), Prof Marina Resmini (placement of PhD students with GSK and Polyintell) and Prof Alice Sullivan (PhosphonicS x2). The School has also encouraged its PhD students to participate in IMPACTQM, the College's £2.9M EPSRC-funded knowledge transfer project (2009-2012). This project enabled 13 research students to take up 3 month placements with business/industry partners, applying their skills gained during their PhD training to challenges and problems in business and industry. Two out of the four "success stories" highlighted in the IMPACTQM website (http://www.qmul.ac.uk/research/ImpactQM/collaborative_research/index.html) are SBCS students; this project has been very successful in enabling our students to use their PhD training to secure careers in industry/business (e.g. Dr Rita Jorge, Scientific Advisor to the Royal Veterinary College and Dr Jonathan Dunn at Cancer Research UK). SBCS staff have

also been involved in IMPACTQM, allowing them to foster closer collaborations with industry (e.g. **Larrosa** (GSK and Pfizer) and **Bray** (Syngenta)). Prof Resmini coordinates an EU-funded IAPP project (Industry Academia Partnership Pathways) where the core of the project requires exchanges of staff between academia and industry. One researcher from QMUL has spent one year working in the company (Polyintell SA, France), while staff from the company will be working in secondment at QMUL during 2014. There are specific QMUL Careers events for STEM researchers considering the transition from academia to industry, where QMUL PhD alumni speak about their careers outside academia. We have also initiated careers events for all research staff and students to which external industrial stakeholders contribute.

d. Income, infrastructure and facilities

Overall new grant income (@100% FEC) awarded to SBCS since 2008 is £31.9M, of which £7.7M was awarded to Chemistry staff (respectively £34.9M and £10.7M if payments in kind for use of central facilities are included). This compares with total grant income to the whole of SBCS of £16M during the RAE2008 assessment period, indicating a significant uplift in research grant funding during the REF period. Highlights in Chemistry include the award of €1.5M to **Larrosa** (ERC Starting Grant - "MakeitSimple"), a Marie Curie Initial Training Network co-ordinated by Prof Marina Resmini (NANODRUG: £3.5M of which £850k to SBCS) and a Royal Society URF to **Goldup** (£415k). EPSRC grants awarded during the REF period to staff submitted to UoA8 exceed £1.8M, with over £3M in awards for use of central facilities at the Rutherford Appleton Laboratory. QMUL is also a partner in a recent £1M EPSRC award of chemistry infrastructure equipment led by UCL.

All the SBCS Chemists are located in a single building; the Joseph Priestley building which also houses the School's NMR and EPR facilities and Analytical Laboratory. The Chemistry footprint within the Joseph Priestley building has been significantly expanded during the REF period with a ca. £1M investment that saw the construction of a new 18-fumehood Homogeneous Catalysis laboratory and associated office space, in space that previously housed an undergraduate computer cluster, and a new computational chemistry suite supporting Theoretical Chemistry. A new biological chemistry and materials laboratory which will contain 10 fumehoods and bench-space is currently under construction and will be operational by December 2013. There is scope for further expansion within the Joseph Priestley building in step with the rapid recruitment of new Chemistry staff. Specifically, there are plans for the conversion of the teaching laboratory located in the second floor of the Joseph Priestley building, currently used for biology teaching, into further research space, with expected capacity for approximately 35 additional researchers by 2017. Our forward plan is to maintain the co-localisation of Chemistry staff offices, laboratories and facilities in the Joseph Priestley building. The College's investment in a new Life Sciences Institute on the QMUL Whitechapel campus will allow further opportunities for expansion in 2017/18.

Support for research activity within SBCS comes from the development of a series of research facilities, each in the charge of a specific skilled technician or experimental officer. These are an Analytical Laboratory; Bioinformatics Clusters; Confocal and Epifluorescence Microscopy; Digital and Photographic Imaging Centre; *Drosophila* facility; NMR and EPR spectroscopy; Protein Purification (including cloning and expression); Surface Characterisation; X-ray diffraction; Zebrafish facility (for the maintenance of wild-type, mutant and transgenic lines). During the REF period SBCS has benefited from significant investment in research infrastructure. Investment of particular relevance to SBCS Chemists includes:

- A *ca*. £1M investment from the College in new laboratories in the Joseph Priestley building for members of the Chemistry division. This provides an additional 18 fume hoods for the Synthesis & Catalysis section together with a computational chemistry laboratory for Physical & Theoretical Chemistry.
- Investment in research equipment of ca £1.3M from the last CIF round including: upgraded equipment for protein imaging, £370k; new laser-scanning confocal and fluorescence microscopes, and Odyssey scanner for infra-red imaging, £430k; new dual source single-crystal X-ray diffractometer with small molecule and protein capacity (£230k)
- New X-ray powder diffractometer (£287k).
- Faculty investment in research equipment in 2011, including a multiphoton upgrade for the Leica confocal microscope (£186k), a new ultracentrifuge for the Joseph Priestley Building (£80k).

- New probe for the 600 MHz NMR spectrometer (£130k) and new console for the Bruker AV(3)400 NMR spectrometer (£130k)
- PELDOR for the X, Q and W-band pulsed and CW EPR spectrometers (£2M).
- £250k in expansion of the main research laboratory in the Joseph Priestley Building and creation of dedicated space for an Atomic Force Microscope.
- £90k for small equipment through the EPSRC initiative for new researchers.

This will be complemented by further significant investment in start-up packages and refurbishment of space as we make our new appointments. Within the wider College, QMUL chemists benefit from close collaboration through the Institute of Materials with the NanoVision centre in the School of Engineering and Materials Science for electron microscopy and X-ray crystallography.

e. Collaboration or contribution to the discipline or research base

SBCS staff contribute to the wider development of their disciplines through membership of journal editorial boards and representation on funding body committees. QMUL Chemistry makes a significant contribution to the wider development of the discipline by hosting conferences: during the REF period 3 meetings of the RSC Heterocyclic Chemistry Discussion Group were organised at QMUL, the 2012 RSC Macrocyclic and Supramolecular Chemistry meeting organised at QMUL by **Watkinson** and **Goldup** was attended by nearly 200 people representing 13 countries, while the 3rd RSC South and East Regional Organic Meeting (2011, hosted by **Larrosa**) had over 100 attendees with an international plenary speaker (Prof. Tobias Ritter, Harvard, USA). RSC half-day symposia at QMUL include "Oxidation and reduction inspired by nature" (2012); "A celebration of women in chemistry" (2013). We hosted "Chemical Biology" (2009) sponsored by RSC, Syngenta and AstraZeneca with international speakers from Scripps and Munich. **Gaskell** is editor-in-chief of a new RSC book series, "New developments in mass spectrometry".

Membership of editorial boards: Chemical Society Reviews (**Goldup** - Advisory Board) Coord Chem Revs (**Vlcek**); Inorganic Chim Acta (**Vlcek**).

Research Council and other funding body committees: EPSRC Peer Review College (**Larrosa**, **Vlcek, Watkinson,** Zarbakhsh); Marie Curie Actions assessor (Resmini); STFC (Zarbakhsh, **Vlcek**); COST (**Vlcek**).

Editorial board and funding body committee membership is currently relatively limited due to the high proportion of young staff, but in future we will ensure that QMUL Chemistry plays its full part in the wider development of the subject, recognising and encouraging such wider contributions through allowance in our workload allocation model, which allows for trade-off of these activities against QMUL internal teaching and administration.

Local, national and international partnerships

Interdisciplinary links exist with the Biochemists in the Division of Chemistry & Biochemistry, with the other Divisions of the School as well as strong links with other sections of the College (for example with the Schools of Medicine & Dentistry, Engineering & Materials Science and Physics). 8 Chemistry staff (including **Chass**, **Goldup**, **Larrosa, Watkinson** and Prof Marina Resmini, submitted to sub-panel B13) are members of the College's new Materials Research Institute, which provides a platform to support dynamic interdisciplinary materials research. These links are encouraged by the College's Life Sciences and Materials strategies, by the award of interdisciplinary research studentships (7 during the REF period) and by a variety of pump-priming funds for interdisciplinary research (awards to SBCS ca. £50k p.a.). SBCS benefits from strong links (including shared grants and studentships) with world-class research facilities at the Rutherford Appleton Laboratory (**Vlcek** and **Chass**). Formal international partnerships include participation in 3 current Marie Curie Initial Training Networks, one of which is co-ordinated by a member of the Chemistry & Biochemistry Division (Prof Marina Resmini). **Vlcek** has collaborations with Caltech and the Czech Academy of Sciences. Industry partnerships include CASE collaborations, **Larrosa**'s collaboration with GSK via a 2.5 year funded PDRA (Org. Lett. 2013, 910), **di Tommaso**'s collaboration with AstraZeneca (supported by a Royal Society Industry Fellowship), **Watkinson**'s collaboration with P & G (supported by EPSRC) and interaction with the spin-out companies Degrasense (**Watkinson**) and PhosphonicS. As part of our research impact and sustainability strategy, the Division is committed on increasing engagement with industry, and recently we have created the position of Director of Industrial Innovation (Prof Marina Resmini) to stimulate the creation of industrial partnerships.