Institution: The Open University

Unit of Assessment: B13 Electrical and Electronic Engineering, Metallurgy and Materials

a. Overview

Materials was one of the founding disciplines at The Open University (OU). Our laboratories at Milton Keynes had developed organically up to RAE2008, incorporating microscopy, X-ray analysis, mechanical testing and creep. Since RAE2008 we have doubled the floor area for experimental work, creating new engineering facilities (e.g. for contour residual stress measurement) and developed new scientific laboratories for studying physical and chemical aspects of materials at the atomic and molecular level, from nanocrystalline solar cells to quantum computing. In addition we are intensive users of international large-scale neutron and synchrotron X-ray facilities.

This submission presents research outputs of ten academics from the Materials Engineering group, which is part of the Department of Engineering and Innovation within the Faculty of Mathematics, Computing and Technology (MCT) and eight academics from interdisciplinary Atomic and Molecular Engineering groups that are based within the Faculty of Science. These groups embrace a common engineering focus and orientation to RCUK themes.

All the research groups represented by this submission have benefited from strategic investment of University funds and support from central teams for grants and contracts, innovation and enterprise, strategy and governance, career development, and management of postgraduate research students.

b. Research strategy

The OU's RAE2008 submission for Materials Engineering (six people) was based entirely on Structural Integrity. The strategy following RAE2008 was to expand the scope and reach of materials and structures research, particularly around our strong historic links with the aerospace and nuclear power industries, and linking to the RCUK *Energy* theme.

Since RAE2008 the Materials Engineering research group has almost doubled in size (now 14 academics, 8 support staff, 10 PDRAs and 15 PGRs); increased its income from research councils, charity and industry; expanded its laboratory footprint (with accompanying investment in new equipment); and increased the quality and volume of research. Core research areas now include Fabrication and Processing, Residual Stress, High Temperature Behaviour, and Structural Integrity. Our research direction has been primarily driven by the engineering needs of the aerospace and power generation (including nuclear) industries. It is closely aligned with the economically important themes of *Energy* and the *Environment.*

Interdisciplinary research into engineering materials at the atomic and molecular level, in the Faculty of Science, encompasses the research of 10 academics, 4 PDRAs and 9 PGRs. The core research theme of these groups relates to the manipulation of matter at the atomic scale to support functionality at a much larger scale, for example polymers, surface functionalisation and microelectronics. Its research aligns with RCUK *Manufacturing the Future, Quantum Optics* and *Information* themes. Since the RAE2008 these Atomic and Molecular Engineering groups have developed cross-faculty links with Materials Engineering through collaborative bids, jointly supervised projects, sharing facilities and embracing a common engineering focus.

Looking towards 2020 we plan to consolidate our position as one of the top five UK materials engineering research communities. We will deliver this strategic objective through maintaining our focus on engineering application, by exploiting our core research strengths, by expanding our Materials for Energy activities, by exploiting cross-Faculty synergies in Materials, and by prioritising the following research aims:

- *To understand and characterise the state and behaviour of materials in an* '*engineered condition*'. This contributes to the efficiency and longevity of safety critical plant, the use of lighter structures in transportation, the nanoscale functionalisation of films and particles, etc.

- *To understand and characterise fundamental processes at the atomic and molecular level that are associated with advanced engineering concepts.* This impacts on the design, manufacture and use of polymers, biomaterials, nano-composites, fuel cells and photovoltaics, and looks forward to quantum computers.
- *To develop and apply novel experimental tools to support our research themes.* We will continue to work with the large-scale neutron and synchrotron X-ray facilities on new methods, as well as developing specialist capability such as high-temperature digital image correlation.
- *To achieve predictive insight by complementing experiments with theory and modelling.* This builds upon our success in linking fundamental laboratory measurements to the next-generation needs of engineering.

We plan to expand our research base and additionally concentrate on:

a) Growing external research income through the development of new industrial research relationships in the UK and worldwide.

b) Growing the number of research active staff and researchers (PDRAs and PhD students) in materials by 50%.

c) Providing specialist consultancy services.

Specific plans and initiatives currently include the following:

- Developing 'communities of interest' within the OU to foster collaboration across disciplines: an Energy Community of Interest has been created, and we will also create a Materials Community of Interest drawing on expertise from both Science and Technology.
- Expanding our research in nuclear materials through the recently awarded International Joint Research Centre for the Safety of Nuclear Energy with the University of Lancaster, University of Tennessee (USA) and Harbin Engineering University (China); and developing our collaborations with other nuclear-research-active UK universities: for example, through leading the EPSRC PROMINENT nuclear fission consortium (Bristol, Oxford, Manchester, Imperial and Loughborough universities).
- Broadening collaboration with India through our five current EPSRC funded civil nuclear projects (£1.5m), and building upon our already successful collaboration with the Australian Nuclear Science and Technology Organisation (ANSTO).

These existing partnerships and new centres will fuel an expansion of our collaborations with the nuclear industry in the UK, France, Australia, India and China.

We will foster relationships with the international neutron and synchrotron facilities, particularly those that are using our SScanSS virtual laboratory system (see section d), through collaborative projects and researcher exchanges. In particular we will strengthen our long-standing relationship with the ISIS Neutron Facility through a programme of jointly funded PhD students that will focus on supporting new instrumentation (a creep–fatigue rig, and the new combined neutron imaging and texture instrument IMAT). In addition, we plan to establish a measurement 'portal' making the new research capability more accessible to industry.

We will expand the reach of our High Temperature Centre through exploiting *Energy* related research opportunities created by our new creep facility equipped with digital image correlation monitoring.

More generally, we will emulate our successful engagement with the power generation and aerospace industries by targeting the petrochemical, automotive and electronics sectors with a view to developing strategic partnerships.

By the end of 2013 we will have established a new Measurement Services Business Unit servicing commercial clients (e.g. contour and neutron residual stress measurements, digital image correlation and creep testing) supported by new strategic investment in staff and equipment from the University. We expect a turnover of at least £300k by the end of year 2. In 2016 we will review

whether to create a spin-out business.

We will strengthen our modelling and laboratory research at the atomic and molecular scale with links to engineering application (computing, microelectronics, radiation damage, coatings and polymers etc.). For example, building on support in 2012 from an EPSRC Bright Ideas Award we aim to implement for the first time full quantum computation that will solve specific computational tasks that are intractable using classical machines. We will also develop our work studying nanoscale plasma and radiation damage in biological materials which is linked to EPSRC Grand Challenges in Chemical Sciences and Engineering (Chemical Control) and Physics (Understanding the Physics of Life and Nanoscale design of Functional Material).

We will direct our thin-film treatments research using silsesquioxanes towards creation of industrial-scale products, for example improved mechanical abrasion resistance and chemical stability of coatings used in the analysis of pharmaceuticals, environmental pollutants, food additives, and coatings for antifouling and corrosion resistance of metals.

We also plan to widen our research in developing functional silsesquioxane–polymer nano-composites with the Warwick Manufacturing Group (WMG). Two industrially sponsored PhD studentships have already been awarded to the OU from a collaboration with ToxiMet, an SME in Sittingbourne, UK, based around the physical analysis of polymeric materials in producing molecularly imprinted polymers (MIPs), and several part-time PhD studentships developing catalyst materials have been funded by Johnson Matthey Technology over the past 15 years.

c. People, including:

i. Staffing strategy and staff development

Post-RAE2008, the strategic objective to expand the scope and reach of materials and structures research around the economically-important RCUK *Energy* theme has been matched by Faculty commitment to prioritise this area through building a 'critical mass' of researchers.

The departure of academic staff within the Materials Engineering group since RAE2008 has been more than compensated for by 10 new strategic appointments. Bouchard was recruited from industry at professorial level and successfully transferred his Royal Society Industry Fellowship to collaborate with Rolls-Royce and EDF Energy; Fitzpatrick was promoted and secured funding for a Chair from The Lloyd's Register Educational Trust; new materials Lecturers Moat and Shirzadi were recruited from Manchester and Cambridge respectively; and Northover was seconded for metallurgical research from a regional academic role.

In 2011–12 six new strategic *Energy* appointments were made within the Faculty of MCT including Nuttall (Chair in Energy, submitted to UoA B7) from Cambridge, and materials Lecturers Chroneos (from a Marie Curie Fellowship in NCSR Demokritos), Krishnamurthy and Hosseinzadeh.

In the Atomic and Molecular Engineering grouping (Faculty of Science), Eden was appointed to an EPSRC funded tenure-track fellowship and three new lecturers recruited, including Turner in the biomaterials area.

Recently we have appointed a Measurement Services Manager to head up a new Consultancy Business Unit that will exploit the success of our Materials Engineering research. Technical support for materials research has been prioritised with several new staff appointments (1 manager and 3 technicians) to cover the increased volume of research and expansion of our laboratories.

New academic staff in this submission have been given priority for Departmental, Faculty and University research funds *en route* to securing independent external income. All staff, whether early career or otherwise, have benefited from thorough induction followed by long-term mentoring (independent of formal management lines). Research and technical staff at all stages of their career engage in continuing professional development to build and maintain research-related skills (e.g. student supervision, bidding for funding, use of analytical equipment and fair selection). There is also an important element of experiential learning through the standard practice of providing PGR supervision in teams of two or three academics with a range of experience. Similarly, PhD

and MPhil examination panels are selected to ensure that new staff can develop appropriate skills from more experienced colleagues.

Annual appraisals are used to review progress, to plan workloads and to oversee career development. The process ensures that research priorities and objectives are clearly stated and that they are consistent with those of the wider team. Key indicators of research success are external income, quality and number of journal publications, and external esteem. Candidates assessed as ready for progression are given guidance in preparing a formal submission to the University Promotions Committee. By these means, Gorfinkiel has secured promotion to Senior Lecturer; Eden made the transition from EPSRC career-advancement fellowship to a tenure-track fellowship (also EPSRC-funded); and Hosseinzadeh made the transition from PDRA to materials Lecturer.

Excellence in research is rewarded on an annual basis through a system of awards within each Faculty. Professorial staff present a case for award for consideration at University level.

The OU is a signatory to the Concordat to Support the Career Development of Researchers and actively works to implement its seven principles. This commitment has been recognised with the European Commission HR Excellence in Research Award.

Since its foundation the OU has had social justice and equality at the heart of its identity and its mission, not just for students, but for all its staff. The OU embraces diversity and works hard to ensure that equality is embedded at all levels of the University and in all aspects of academic practice. In April 2013, the OU gained Athena Swan Bronze status.

The OU's commitment to equality and diversity is reflected in our UoA submission which has a female:male ratio of 5:13 and includes six nationalities.

ii. Research students

The post-RAE2008 plan to expand research in the materials area was boosted by annual competitions for Faculty-funded PhD studentships and University 'Charter' studentships (2010–11). In each case internal funding was granted on a competitive basis taking account of the strategic alignment of the research project, the quality of the prospective student and the amount of co-funding levered from industry. By promoting co-funded studentships we successfully fostered strong engagement with industry allowing us to increase the number of externally-funded PhD students associated with this UoA. This is evidenced by the increase in doctoral degrees awarded by the end of the assessment period.

Postgraduate student recruitment has been achieved through advertisements on the OU website, via jobs.ac.uk and informal approaches. The selection process involves short-listing (by two people) for interview based on a submitted application form and CV. Interviews involve at least two internal staff (preferably including one from outside the proposed supervision team) and follow the OU's staff recruitment policies (including specific standards on gender and ethnic inclusivity).

PGRs are allocated personal desk space with a networked computer, and have full access to our infrastructure. Training in the use of specialist laboratory instruments is provided. They have one primary supervisor and at least one secondary supervisor in addition to a mentor who is an academic outside the supervision team. The supervision team meets with the PGR on a frequent basis (weekly to monthly).

Postgraduate training begins with a skills audit and needs analysis that forms the basis on which individualised future training is planned. Students are able to measure their own development as researchers by regularly updating their Progress Files and completing progress reports every six months. In the first year there is compulsory formal training in generic skills such as information literacy, presentation and research methods, coordinated by an online module. A new Virtual Research Environment, launched in October 2013, provides a dedicated web portal, designed and built to the OU's world leading standards, giving access to a virtual environment for news, careers, supervision, library, social media and administrative resources, which ensures parity of experience to all OU research students regardless of their physical location. The OU Library also offers online careers services and face-to-face advice.

Progress and training of PGRs are monitored through six-monthly progress reports. At the end of the first year, initial MPhil registration is upgraded to PhD following demonstration of a satisfactory academic standard via a presentation, a written report and a mini-viva which are independently assessed outside the supervision team. All students have access to a third-party monitor from outside the supervision team for additional support; this has been recognised by the QAA as a distinctive feature of the quality of our research student support. PGRs are expected to present on-going work around four times per year at the monthly Materials Engineering group meeting, to which an external speaker is usually invited. In addition PGRs participate in monthly sessions where a selected journal paper is critically reviewed and debated. Wherever possible PGRs are encouraged to spend several weeks in industry or at a research facility: for example, two students have been seconded to the ISIS Facility ENGIN-X beamline over the past couple of years. We regularly host visiting summer students (e.g. from Arts et Métiers ParisTech) which enriches the research environment for the PhD students.

PGRs are also encouraged to participate in the annual OU student research poster competition. Industry-funded students are expected to write annual reports and regularly present technical work to their sponsors. By the end of their PhD, PGRs are expected to have presented their work at an international conference and published at least one article in a peer-reviewed journal.

d. Income, infrastructure and facilities

Research income (REF4b) in the assessment period exceeding £5m has come from BIS Research Councils (£3m), UK and international industry partners (£1m), charities (£0.5m) and other government bodies (£0.5m). This has been supplemented by £0.5m consultancy income (not included in REF4b). Details of grants, industry funding and awards are mentioned in the narrative below as well as under section **e** (Collaboration or contribution to the research base).

Research income-in-kind (REF4c) from BIS Research Councils over the assessment period exceeding £2.6m has been awarded to support our intensive research at neutron and synchrotron facilities in the UK and France, as described in section **e** (Collaboration or contribution to the research base).

Our current research funding portfolio is based on grants from Research Councils, the Royal Society, charities (Lloyds Register Foundation), various industry partners, and other government agencies (TSB, US Air Force European Office of R&D). We plan to increase funding from all these sources as described above under section **b** (Research Strategy), as well as generate income from the recently founded Measurement Services Business Unit. Our future investment in staff, infrastructure and facilities will match activities related to industrial and research funders' priorities, as exemplified by our track record.

Since RAE2008, the Faculty of MCT has spent over £1.5m refurbishing its Materials Engineering laboratories and purchasing new specialist equipment. This investment has levered a Demonstration Grant (£110k) for equipment from The East Midlands Development Agency and over £1m industry funding for our research.

A new Residual Stress Engineering Facility has been created for our world-leading Contour Method research and consultancy activities. The Engineering Workshop has doubled in size allowing forklift handling of heavy components (up to 1.5 tonnes) and two new wire electro-discharge machines have been procured for cutting large complex components. A new air-conditioned metrology laboratory houses a unique hybrid laser-touch-probe coordinate measurement machine designed to measure the deformation of large cut surfaces. This laboratory also contains a new 3-D optical confocal/interferometric microscope capable of nanometre surface contour resolution.

Two high-temperature laboratories have been upgraded with air conditioning and now house 20 static and dynamic creep machines. A new 250 kN electro-mechanical creep machine has been procured and nine of the static creep rigs refurbished. Testing is now supported by new calibration equipment and extensometry plus an integrated control and data acquisition system. In addition, redundant office spaces were converted to accommodate a thermal cycling laboratory that also houses a new suite of equipment (preparation, autoclave and press) for diffusion bonding, as well

as the metrology laboratory mentioned above.

One of the creep laboratories, having temperature, light and vibration control, is dedicated to digital image correlation (DIC) strain measurement at temperatures up to 1000˚C (a unique facility). A separate new laboratory is used for room temperature DIC testing of inhomogeneous samples (for example cross-weld specimens).

The Inter-Faculty Electron Microscopy suite has been enhanced with a new JEOL2000FX transmission electron microscope, and upgraded EBSD and EDAX capability for our scanning electron microscope.

The post-RAE2008 expansion of facilities described above complements our existing mechanical testing laboratory (five servo-hydraulic test machines), materials characterisation laboratories and X-ray diffraction suite.

The laboratories of the Atomic and Molecular Engineering groups include high- and medium-vacuum experimental platforms for projects on quantum information, plasma processing and molecular clusters. These are complemented by semiconductor-device test and chemical synthesis facilities.

Shared interfaculty facilities provide access to SEM, FEGSEM, XPS, XRD, AFM, microprobe, nanoSIMS, nanoindentation and optical microscopy for analysis of solid materials (metals and alloys, semiconductors, minerals, catalysts, nanotubes and nanoparticles) with micron to sub-nanometre resolutions. For numerical modelling work there is a Linux Cluster that is shared across the two Faculties.

The workshop and laboratories are supported by dedicated teams of technicians and project officers. For example, five technicians cover the Materials Engineering facilities. Requests for project work in each Faculty are logged using an Access database system and prioritised. In 2010 the Materials Engineering group successfully introduced a barcode data-logging/tracking system for controlling both research and consultancy test specimens. Our system has been ported recently to the University of Manchester. A set of quality assurance principles has been developed, driven by our increasing engagement with industry.

In addition to research, we use our extensive characterisation, test and measurement equipment to generate income from external contract work. Since 2008 this income has been about £0.5m (e.g. from British Energy, EDF Energy, Rolls Royce, AREVA, AMEC, TWI, Det Norske Veritas, and assorted forensic legal consultancies). We also have long-standing consultancies with instrument manufacturers (e.g. Hiden Analytical, Oxford Instruments, Plasma Technology, TWI). Work stemming from silicon materials development has generated Knowledge Transfer Partnerships (KTPs) with Hichrome (£200k) and Cornelius Specialties (£221k), a CASE award with TWI and consultancy work with Safeguard Europe Ltd, a UK company. In addition, a network of manufacturers and users of siloxanes in the UK is being developed to expand the presence of UK PLCs in the international silicones R&D area.

In October 2013 we established a new Measurement Services Business Unit initially geared towards providing residual stress measurements to commercial clients, but later we expect to offer DIC, creep testing and other services with a turnover of at least £300k per annum by the end of year 2.

Our system for virtual design and *in situ* control of experiments at large-scale facilities, SScanSS, has become the international standard for residual strain measurement and is now installed at eight neutron and synchrotron facilities worldwide, generating an income of around £200k.

e. Collaboration or contribution to the discipline or research base

Materials Engineering at the OU has spearheaded collaborative national and international research in nuclear power technologies over the past six years. Following participation in the £6m EPSRC-funded ‘Keeping the Nuclear Option Open’ programme, Fitzpatrick is leading the £1.8m PROMINENT consortium (OU, Oxford, Bristol, Imperial, Manchester, Loughborough) funded by the EPSRC Nuclear Fission call, integrating with complementary research into oxide-dispersion strengthened (ODS) materials at Oxford and the Australian Nuclear Science and Technology

Organisation (ANSTO).

Our work in the nuclear energy sector extends into government policy. Fitzpatrick gave evidence to the House of Lords Select Committee on Nuclear R&D Capabilities in 2011, and in 2010 joined the Foreign Office delegation to India that led to development of a long-term civil nuclear research collaboration between ten UK universities and the Department of Atomic Energy in India. Following this initiative, Bouchard is leading the RCUK £0.3m Indo–UK JOINT project (OU, Bristol, Manchester, Imperial) that is collaborating with the principal nuclear research laboratories (BARC and IGCAR) in India. He is also participating in two new (2013) UK–India research programmes TRANSFER (£0.5m) and DMW-Creep (£0.75m) with Bristol, Manchester and Oxford.

We work with both the academic (Imperial College, Bristol, Strathclyde and Manchester) and industrial partners within the EDF Energy (UK) High Temperature Centre, which has funded £0.5m of work in the Materials Engineering group at the OU since 2008 (and over £1m since 2004). We are also members of the EDF (France) Materials Ageing Institute and collaborate closely with the French nuclear power plant constructor AREVA through various research contracts and European research networks. For example, the OU Materials Engineering group was a founder member (2002) of the Network on Neutron Techniques Standardization for Structural Integrity (NeT) in which over 40 industry and research organisations from Europe and beyond are currently involved.

Our reputation in contour method residual stress measurement research has positioned us as the partner of choice for technology transfer, even for organisations based in the USA where the method was invented and patented. Groups in the UK employing the method often use our unique, dedicated facilities and embedded expertise for the critical sectioning step of the process, and we are working with NPL and FESI for the dissemination of best practice.

We pioneered the application of neutron and synchrotron X-ray methods to the study of residual and internal stresses in materials. The original £3.5m design and build of the ENGIN-X engineering instrument at the UK ISIS neutron facility was led by the OU and the software we developed for experimental design and execution is licensed and used at an increasing number of facilities worldwide. We run alongside Manchester as the most intensive users of ENGIN-X: all beam time on the instrument is awarded competitively following peer review by an international selection panel and the instrument is typically oversubscribed up to three times. We are highly successful in obtaining beam time at facilities around the world, again, all awarded competitively by peer review. In the last three years alone we have run experiments at ISIS (UK), the European Synchrotron Radiation Facility (France), the ILL (France), Chalk River (Canada), BESSY (Germany), HZB (Germany), JCNS (Germany), FRM-II (Germany), PSI (Switzerland), SNS (USA) and APS (USA). Beam time for the first three is reflected in our in-kind income.

We are now contributing to the design of the new £10m IMAT instrument and a multi-instrument creep–fatigue rig at ISIS and have a programme of jointly funded PhD students with the facility. We are extending our application of neutron techniques in engineering to other neutron instruments and techniques through a recent OU/Bristol Long-Term Proposal (2012–15) at ISIS for studying steels for nuclear systems. These include the high-resolution diffractometer HRPD for study of material structure; the GEM instrument for texture measurements; and SANS2D (small-angle neutron scattering) for the study of damage development during creep and particle dissolution in processing of ODS materials. At an international level we are collaborating with the Bragg Institute (which hosts the OPAL research reactor) in Australia through student secondments, and with NECSA in South Africa through a jointly supervised PhD project, as well as supporting the eight facilities using our virtual laboratory.

Our fundamental work on electron interactions with molecules and clusters is linked to EPSRC's Grand Challenges in Chemical Sciences and Physics (Understanding the Physics of Life and Nanoscale Design of Functional Material). We have won over £1.2m in EPSRC funding in the last five years (two joint projects) and Royal Society funding to work with Russian partners in Novosibirsk. We are also part of a 15-member EU consortium (€18 million) on Single Nanometre Manufacturing (for next-generation semiconductor technologies), which involves Oxford Instruments Plasma Technology and the Belgium-based IMEC (Interuniversity–industry Microelectronics Centre) and several other European partners. We also work with the CNRS teams in Grenoble and Paris on plasma etching and plasma technology.

Members of the submission have a strong external presence. Between them they sit on over 20 international conference committees, 8 RCUK panels and advisory groups, and hold various positions in professional bodies and national committees, for example:

Bouchard held a Royal Society Industry Fellowship from 2008–11. He is a Chartered Engineer and a Fellow of the Institution of Mechanical Engineers.

Fitzpatrick was awarded the Lidstone Medal of The Welding Institute for 2008, for the advancement of welding technology. He is a Fellow of the Institute of Materials, Minerals and Mining, a Chartered Engineer and a Chartered Scientist.

Shirzadi is a Deputy Editor of *Scripta Materialia*; **Fitzpatrick** is the inaugural Materials Engineering editor for the new open access *Journal of Engineering* launched in 2012 by The Institution of Engineering and Technology; **Braithwaite** is Associate Editor for the *Journal of Plasma Sources Science and Technology*.

Bouchard chairs the Science and Technology Facilities Council's (STFC) ISIS Facility Access Panel FAP7, Engineering, 2009–13, and reviews neutron beam research proposals for the Canadian Neutron Beam Centre (CNBC). **Fitzpatrick** is a member of the selection panels for the Diamond Light Source in the UK and the Oak Ridge National Laboratory in the USA. He was a member and Chair of the selection panels for the Laboratoire Léon Brillouin, Saclay, France, from 2009–12. He was a member of the STFC Neutron Advisory Panel from 2009–11 and was a member of the Technology sub-group for the STFC Programmatic Review in 2012–13. He is a member of the EPSRC College. Since 2012 **Moat** is a member of the ILL panel reviewing neutron scattering research proposals in the area of engineering, materials and instrumentation. **Braithwaite** is a member of the EPSRC College and a Fellow of the Institute of Physics.

Bouchard contributes to various R6 Procedure Panel sub-groups developing weld residual stress simulation guidelines, benchmarks and profiles (2008–13). He also represents the UK on the ISO working group (under ISO/TC 135) developing a full standard for determining residual stresses by neutron diffraction.

Shirzadi is Guest Professor at the newly established International Research Institute for Steel Technology, Wuhan University of Science and Technology, China (2010–13). He also held a Marie Curie Knowledge Transfer Fellowship at AGH University of Science and Technology, Krakow, Poland (2009–10). He is a Chartered Engineer and a Fellow of the Institute of Materials, Minerals and Mining.

Eden is an independent expert evaluator for the award of Marie Curie Reintegration Grants by the EU Research Executive Agency, 2012. He is a member of the EPSRC College.

Gorfinkiel is Chair of the Institute of Physics' Atomic and Molecular Interactions Group (2011–13). She is a referee for the US National Science Foundation.