| Institution: King's College London |
|---|
| **Unit of Assessment: UoA 8 (Chemistry)** |
| **1. Unit context and structure, research and impact strategy** |

## 1.1.Unit context

The UoA submission comprises our new Chemistry Department, which has only been in existence since 2012. The department has witnessed an extraordinary period of development from a zero base to 18.5FTE permanent Principal Investigators (PIs); more than doubling in size over the REF period (**fig.1**). Our REF2020 UoA submission consists of 19FTE (**table1**).

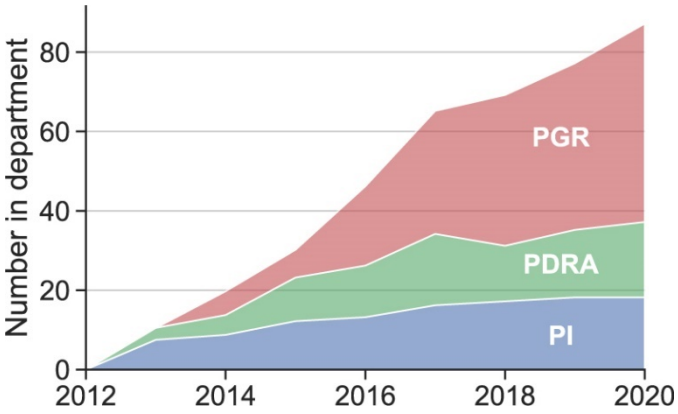


***Fig.1*_Chemistry Department growth.** PDRA=postdoctoral research assistants, PGR=postgraduate student.

| Chemistry Department | July 2013 | July 2020 |
|---|---|---|
| PIs | 7.5* | 18.5* |
| FTE returned in UoA8 | 0 | 19† |
| PDRAs | 3 | 19 |
| PGRs | 0 | 50 |
| Total research funding | £2M | £21M |

***Table1*_Growth over REF period** **Eggert* 0.5FTE joint appointment, returned in UoA5, †18PIs plus 1 independent researcher *Findlay*.

We are a growing, dynamic department that is smaller, younger and more gender diverse than UoA8 norms. The mean age of PIs returned in our UoA is 43 and 50% started their first permanent academic appointment in the assessment period, over which time our average size has been ~16 PIs. Our open, inclusive working environment has helped us achieve gender representation above national averages for chemistry, *e.g.* 50% female professors *c.f.* 9% nationally (**section-2.10**, **fig.10**).

Our re-launch began with a nascent department in King's Health Partners (KHP) led by *Morris* (then Head of the School of Biomedical Sciences, now *Emeritus Professor*) with a 25% interim Head of Department (HoD) (*Blower*, also Head of Imaging Chemistry and Biology). In 2014 we became a cornerstone of a strategic expansion of physical sciences in the university. King's acquired and fully refurbished a stand-alone, 4-storey chemistry research building, "**Britannia House**" (**fig.2**) and the department moved into the Faculty of Natural and Mathematical Sciences accompanied by the appointment of a full-time Head, *Booth*. Our success presaged further large-scale development of science at King's alongside the re-start of an Engineering Department. The faculty is thus now **Natural, Mathematical and Engineering Sciences (NMES).** We profit from our position in central London and opportunities afforded by King's partnerships with the **Francis Crick Institute (the Crick), Rosalind Franklin Institute (RFI)** and **London Centre for Nanotechnology (LCN)** (REF5a,1.5).

Our friendly, vibrant department has flourished over the REF period. We have achieved the remarkable objective of creating a contemporary, research-active Chemistry Department that enshrines the rigour of the discipline but is free of conventional subject constraints. We have exploited our inherent positioning at the physical and life science interface to instil a clear identity and have become renowned for the **chemistry of life**. Moreover, we have seeded areas for future growth in **chemical biotechnology** and **bioelectricity**, as part of King's propitious engineering rejuvenation.


***Fig.2*_Britannia House chemistry research building on Guy's Campus with King's campus map** (institutional statement REF5a,1.3)

## 1.2.The interdisciplinary landscape of Chemistry at King's

A central goal of the department is realising the transformative power of chemistry across discipline boundaries against the commanding interdisciplinary landscape of King's. **King's "Vision 2029"** (REF5a1.4) to "deliver world-leading research focussed on meeting societal need" lies at the heart of the department's development. We also take advantage of the **PLuS Alliance** (REF5a,4.5) between King's, Arizona State University and University of New South Wales, whose mission is "Global solutions with impact".

King's global reputation in translational medicine underpinned by strong biomedical science, embodies the university's interdisciplinarity. A focal point is KHP, which is 1 of 8 accredited UK Academic Health Sciences Centres (REF5a,1.5). The opening of the Crick in 2016, with King's as one of the 3 university partners (together with University College London (UCL) and Imperial College (Imperial)), contributes further word-leading expertise.

King's biomedical environment provided fertile ground for our embryonic department. We pioneered a new direction afforded by the rich sophistication of chemistry to advance understanding of life at the molecular level, embodied in our **chemistry of life** research. We are well placed to work collaboratively across King's to develop new therapeutic molecules, materials and healthcare tools. We have fulfilled the twin goals of re-introducing a home for fundamental chemistry, as well as providing a central hub for physical-life science collaborations (**fig.3**). As such, Chemistry at King's reaches beyond the department linking with Physics (notably Biophysics and

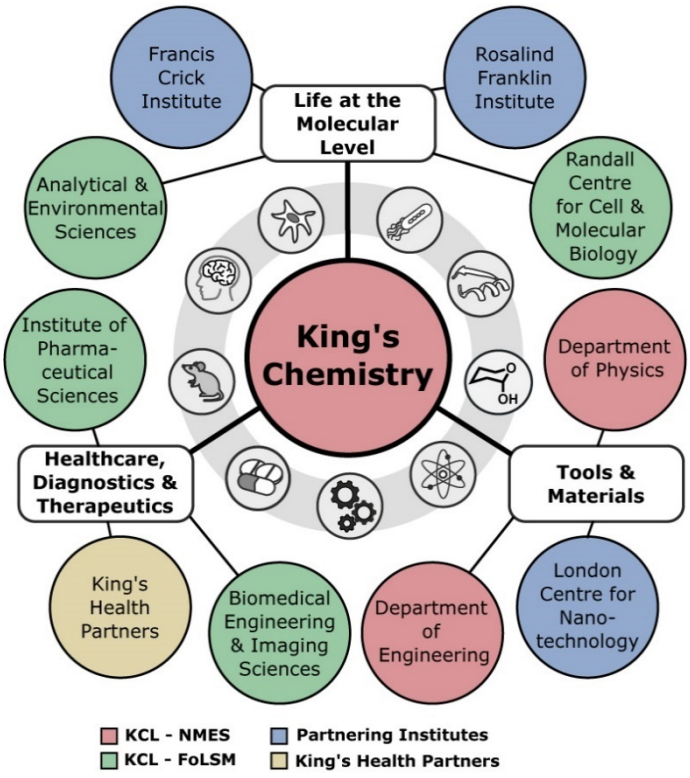


***Fig.3*_King's Chemistry Department as a fundamental "central science" hub.**
FoLSM=Faculty of Life Science and Medicine

Soft Matter, *Garcia-Manyes* UoA9) and Cell Biology (Randall Centre for Cell and Molecular Biology, *Eggert* UoA5), through analytical science (mass spectrometry (MS) of King's Forensics, Analytical and Environmental Sciences, UoA24) to applications in Imaging Chemistry (Biomedical Engineering and Imaging Sciences, *Blower* UoA12) and Pharmaceutical Chemistry (Institute of Pharmaceutical Science, UoA3). We have also forged links with the Crick, with *Booth* heading **"King's Chemistry at the Crick" (K*em*Crick).**

### 1.3.Strategy for the renaissance of King's Chemistry

The start of the REF period coincides with a pivotal point in our development: the arrival of our inaugural Head, *Booth*, our move into Britannia House and the launch of our ambitious strategic vision:

**KING'S CHEMISTRY VISION**

**Create an international centre of excellence recognised for transcending the boundaries of chemistry**

**Forge new frontiers at discipline interfaces and deliver fundamental solutions for a sustainable and healthy society**

**Strategic Strands**

*New chemical frontiers through research*
*A new generation of scientists*
*Re-imagining how we work*

We embraced the unique opportunity to rebuild afresh from a blank canvas and invested in young, visionary scientists. Our publication record is notable for such a young department and mirrors our interdisciplinarity (**table2**). Aside from core Chemistry journals, (*Angew Chem, Nature Chemical Biology and Nature Chemistry*) we publish in life science (*eLife*), nanoscience (*Nano Letters, Nature Nanotechnology*), prominent science journals (*Nature, PNAS, Science*) and contribute invited reviews and methods papers (*e.g. Current Opinion* journals and *Nature Methods*).

We have been ranked as the top Chemistry Department in London by the Guardian league table for the last 3 years. We have also risen rapidly up the Complete University Guide (being 15th in 2021, 2nd in London behind UCL).

| | |
|---|---|
| **Total number of papers** | 494 |
| **Modal journal impact factor** | 14.7 |
| **Total citations** | 9917 |
| **Average citations per paper** | 20 |
| **% collaborative papers** | 78 |
| **% interdisciplinary papers** (*Scopus* classification) | 69 |

***Table2*_UoA publication record over REF period**

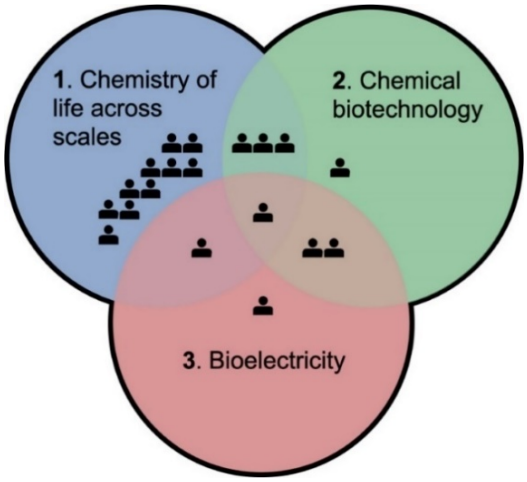


***Fig.4*_Overlapping research themes.** Highlighting UoA PIs main area of research over the REF period

### 1.4.Research Themes

We harness our interdisciplinary skills in **3 research themes** (**fig.4**). A goal of our **chemistry of life** research is to usher in a new era of functional biology by moving from a descriptive picture of life sciences to a quantitative understanding using chemical principles. Our biological wisdom augments our chemical research and we are exploiting this through novel biocompatible components and approaches to sustainable science in **themes 2 and 3**. To avoid diversifying too early in a small, evolving department, a key objective was to establish ourselves with a distinctive research focus on **theme1**, whilst laying foundations for our 2 additional themes.

*Theme1.Chemistry of life across scales - a new era of functional biology*

In REF2014, the proto-department of 7.5FTE was split across UoAs3&5 with no UoA8 submission from King's. Continuing with the 2014 statement of intent to grow chemistry in a biomedical context, we have built critical mass with 15 of our 19FTE working on the **chemistry of life**.

We take a whole-scale view to understand how molecules work together to generate cellular life, combining chemical and synthetic biology with biophysical, computational and synthetic chemistry. 7FTE focus on **biomembranes** that are fundamental to cellular life; devising new tools for their study, investigating their biosynthesis and regulation, breaching membranes with *de novo* antimicrobial peptides and reconstructing them in artificial cells (*e.g. Ulmschneider-Nature Comms:2016* and Eve BioTek start-up drug-development platform). Another core area of 8FTE centres on **bioactive compounds**: exploiting their biosynthesis, devising novel chemical/semi-synthesis and uncovering biomolecular recognition mechanisms (*e.g.Cobb-JACS:*2020, Müller-*Nature:2017*).

Over the next 5 years we aim to coalesce our research around our **fundamental chemistry for a healthy society** vision, laying foundations for therapeutics targeting **antimicrobial resistance (AMR)** and diseases arise from **membrane protein misfolding** or protein backbone post-translational modifications.

*Theme2.Chemical biotechnology - interfacing biology with materials*

Biotechnology harnesses biological processes in the development of new technologies. We are using our combined biological/chemical knowledge to introduce novel chemical angles. For immediate impetus, we exploited expertise of 4FTE of **theme1** to address key challenges around the behaviour of "soft" biology (proteins/biomembranes/cells) at interfaces with synthetic "hard" materials and electronics. This is exemplified in *Surman's* **systems chemistry** (*PNAS:*2019*)* and *Brogan's* development of non-aqueous, **environmentally-friendly biocatalysts** (*Nature Chemistry:*2018). New appointments in 2020 will allow us to provide novel **electronic materials** through metallopolymers *(Musgrave-Nature Chemistry:*2012) and organic semiconductors (*Bojdys-Advanced Materials:*2017).

*Theme3.Bioelectricity - clean sustainable energy*

We aim to adapt reactions to interface with the environment by capitalising on our expertise with biocompatible components. This theme is underway with concurrent research and impact development. Through King's PLuS Alliance, *Aldous* has developed an electricity-generating thermogalvanic brick (featured on BBC "Inside Science") and will progress this over the next 5 years via a new start-up company VBeck LLC (USA patent application 62/747595) alongside wearable thermocells (*Advanced Energy Materials:*2020). *Bojdys* will be scaling-up his licensed rechargeable battery raw materials (**section-4.4**).

A future goal is to expand our computational provision (**section-3.5**) to underpin all 3 research themes, led by *Ulmschneider* who is trialling a carbon-neutral High Performance Computing (HPC) cluster on an offshore windfarm.

## 1.5.Developing Impact

Being mindful of our infancy in relation to the time required for impact development, we have laid foundations in 3 areas, **towards therapeutics**, **analytical science** and **sustainable energy** by:

- gaining first-hand experience of successful impact from chemistry research embedded in King's applied interdisciplinary research centres *e.g.* **IPS** and **King's Forensics** (**section-1.2**, **Impact Case Studies REF3**), exemplified by *Hider*'s original development of β-thalassemia drug, Deferiprone (valued at £26.2M in 2018) and next generation hydroxypyridinone therapeutics.
- cultivating home-grown impact, learning from *Blower*'s exploitation of fundamental chemistry in the commercialisation of new radiopharmaceuticals (**REF3**). We have incorporated impact development into our research themes, seeding areas of future potential with industry partnerships and **impact accelerator awards (IAAs**) (REF5a,4.2 and **sections-2.4&4.4**);

- investing in unique analytical capabilities, notably **hydrogen-deuterium exchange (HDX) MS for membrane proteins** (Booth/Borysik/Politis/Reading). The potential for impact from analytical chemistry research is demonstrated by King's Forensics Drug Control Centre (DCC) (**REF3**). The DCC's world-leading MS expertise has provided outstanding infrastructure and support for us to equip and maintain a core MS facility and our advanced HDX-MS research suite.

Furthermore, we have instigated **Science-Art** and **"Invisible Careers in Science"** initiatives to engage broader communities.

### 1.6.The future

**REALISING KING'S CHEMISTRY VISION**

*New chemical frontiers*

We will cross new interfaces by expanding our research themes.

Advancing our **fundamental chemistry for a healthy society** vision, a strategic priority for NMES is to exploit Chemistry's central positioning in the King's interdisciplinary landscape (**fig.3**) to create a new **Research Centre for Physical Science of Life** (co-led by *Booth* and *Garcia-Manyes*). The centre will serve as a nucleus for fundamental science driving new discoveries and innovations in biomedicine.

Advancing our **fundamental chemistry for a sustainable society** vision, we will build capacity in **chemical biotechnology** and **bioelectricity** notably with King's Engineering in the space of low carbon futures.

*A new generation of scientists*

These new chemical frontiers will be underpinned by doubling our size to 40PIs over the next 10 years, investing in inventive chemists who are comfortable working across traditional boundaries. We will expand PGR and PDRA training and inspire researchers to tackle emerging challenges in modern society providing **therapeutic, analytical science** and low carbon solutions.

*Re-imagining how we work*

Our aim is to develop a new norm for Chemistry, making the most of the dynamic research environment at King's and across London. We will continue towards our goal of challenging perceptions of chemistry, advancing our **Science-Art and Invisible Careers in Science** initiatives and augmenting our notable gender diversity to enrich our inclusive, supportive departmental culture.

### 1.7.Open research

A feature of the Open Research culture at King's (REF5a,2.3) is good engagement with faculties through regular meetings with King's Open Access Research Group Initiative (KORGI). We advocate Open Access (OA) publishing in line with King's, funder and REF policies and our grant application procedure ensures OA requirements are met, data management plans properly formulated and OA costs requested or King's OA block grant used. King's Libraries and Collections provide an excellent service with centralised quality control and updating of King's Pure repository, generating automated reminders to PIs. PIs access online training provided by KORGI on research data management, use of Pure and REF compliance. Our department computing committee has engaged with KORGI to inform King's Research Data Management Roadmap.

PIs deposit data in open access public databases (Small Angle Scattering Biological, Biological Magnetic Resonance and Protein Databanks, Cambridge Crystallographic Data Centre and dichroweb). We use preprint servers (BioRXiv, ChemRXiv, zenodo.org) to enhance open access.

### 1.8.Research integrity

We have instilled research integrity as we grow, embedding instructions into PI, PDRA and PGR inductions. We have focussed on good practice in data reproducibility. All PGR first year vivas include discussions on data presentation and reproducibility and we emphasise raw data publication in supplementary information and PhD theses' appendices. *Ulmschneider* has worked with NMES to ensure the King's centralised data storage (employing Ceph) is suited to our needs and we have additional in-house storage. Our next step is to increase training as King's Centre for Research Staff Development (CRSD) and Centre for Doctoral Studies (CDS) enhance their provision (REF5a,2.2) and researchers are now attending courses such as Managing Your Research Data, Producing High-Quality Figures with Integrity and Research Integrity. Our Integrity Advisor (*Wallace*) provides support and works with the NMES Research Integrity Champion to ensure we meet UKRI Policy.

## 2. People

### 2.1.Collegial community

The department is led by *Booth* with *Ulmschneider* as Deputy Head. We empower our young team (**fig.5**) with Early Career (EC) staff playing key roles in shaping the department. Only 20% of our Leadership Group and 18% of our Management Group are Professors (67% and 50%, respectively are female). Communal PI working is the norm. Laboratories and offices are shared with flexible use of space and we have on-site break-out spaces, café and garden, all of which facilitate exchange of ideas, good practice, interdisciplinarity and mutual support for growing research groups. We profit from an engaged Scientific Advisory Board for which we hold a biennial Research Showcase.

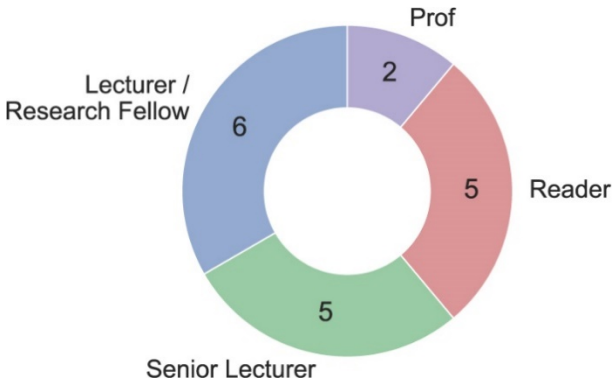


***Fig.5*_Career stage of our UoA8 18 PI's (2020)**

### 2.2.Effective recruitment strategy

Staff are attracted by our friendly, dynamic atmosphere and the chance to play a central role in creating a new department. We have an informal recruitment-consultation group with direct input from EC PIs and open dialogue during applicant visits. We look beyond conventional metrics for research creativity especially across discipline boundaries.

As a department with ample room for expansion we have advertised across the breadth of chemistry to identify talent, whilst exploiting our agility to seed areas judiciously (*e.g.* **themes2&3**) and build up clusters of expertise, *e.g.* **HDX-MS** (**sections-1.5&3.4**)

Our vision has yielded **international** "reach" with ~45% of PIs recruited from abroad. Several PIs hold international visiting appointments including *Bojdys* and *Díez-Pérez* as Visiting Professors at Humboldt University, Germany and Weizmann Institute, Israel, respectively. *Aldous* is a PLuS Alliance Fellow. We have hosted 10 visiting research fellows/associates from abroad as well as a visiting professor from Chile and lecturer from Ireland.

We place considerable emphasis on inclusion (**section-2.10**), using inclusive language and gender de-coding in all staff and PGR adverts, gender-balanced panels and requesting an inclusion statement for PI roles. We check issues such as accessibility and have readily accommodated applicants who use wheelchairs, assisting with travel in London. All staff and PGR recruitment follows King's guidance on **equality, diversity and inclusion (EDI**, REF5a, 3.5) to safeguard against bias and all PIs take King's CRSD "Diversity Matters" training.

## 2.3.Research Fellows

We are keen advocates of research fellows, providing a mentor for all internal and external applications and job security with *proleptic* permanent lectureships that are taken up at the completion of an independent PI fellowship (**table3**). Thus all our category A staff, bar 1, are on permanent contracts. *Findlay* is on an open-ended contract (per King's policy for researchers with fixed-term contracts >4 years). Additionally we are successful with postdoctoral fellowships (**section-2.7**).

| Year | PI | Fellowship | Amount |
|---|---|---|---|
| 2014 | Suntharalingam | Leverhulme Early Career | £0.09M |
| 2016 | Müller | Wellcome Trust Sir Henry Dale | £1.06M |
| 2018 | Rosta | EPSRC Early Career | £0.82M |
| 2018 | Salehi-Reyhani | EPSRC Innovation | £0.57M |
| 2019 | Reading | UKRI FLF | £1.11M |

***Table.3_*** **UoA Independent Research Fellows over the REF period.**
All with permanent departmental appointments

## 2.4.Impact development and industrial engagement

King's provides an inspirational environment (REF5a,4.3&4.5), reflected in the university ranking in the top 10 globally in the Times Higher Education Impact League Table. Our impact lead *Bojdys* contributes to our **NMES Enterprise and Engagement (E&E) ecosystem** (**fig.6**) and staff engage via monthly "Encouraging Enterprise" events. We employed an in-house expert, *Teague* to embed impact early in the department and placed emphasis on building industry relationships via IAAs (**sections-1.5&4.4**) and PhD studentships, securing 9 CASE awards (primarily EPSRC or BBSRC). *Surman* and *Ulmschneider* also supervise students on King's "Entrepreneurial Mindset" programme. Our **strategic project manager (SPM)** supports industrial engagement and is planning a "Chemistry Business Club", exploiting CASE/industry relationships and "MedCity" (REF5a,1.5). We also involve King's Fundraising and Alumni Office.

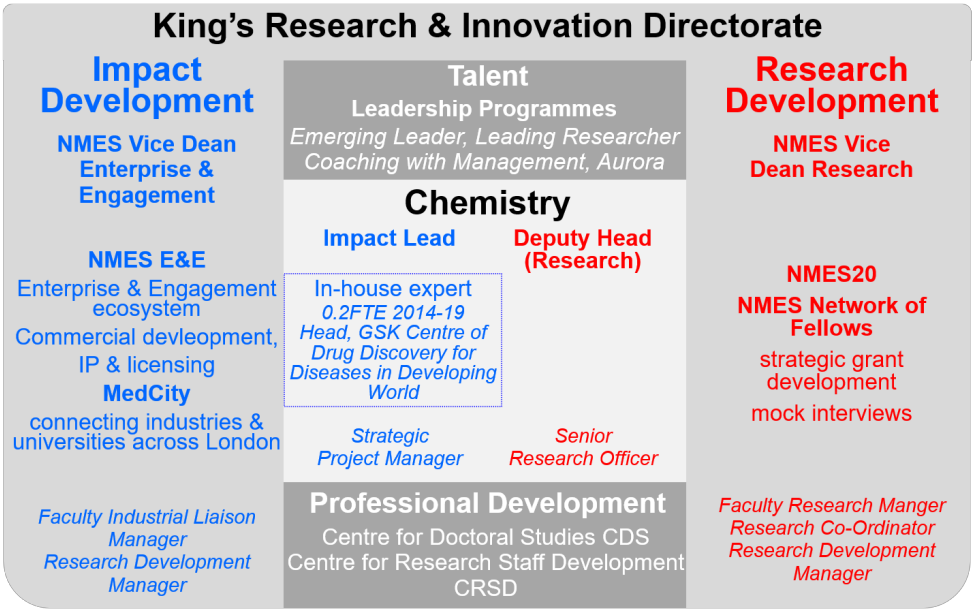


***Fig.6_*** **Research, impact and professional development support**

### 2.5.PI development

We inspire and build the confidence of staff, instilling an ethos of collegiate responsibility. We have a shared, dynamic leadership approach with mutual mentoring and counselling from our HoD, Deputy, *Blower* and *Morris*. A large proportion of our junior staff (68%) progress to departmental and faculty leadership roles and mentor the next EC generation (*e.g.* Reader *Ulmschneider*-Deputy Head; Lecturer (Academic Education Pathway, AEP) *Coulshed*-NMES EDI Chair). All new joiners are assigned a mentor to help them flourish and create personal development plans, with regular formal and informal meetings. All staff take part in an annual "Performance Development Review" (PDR), with additional individual meetings with the HoD.

We engage proactively with King's professional development, with all PIs taking CRSD courses on topics such as PhD supervision, group management and safety. Over half our staff have participated in **King's Talent Leadership Programmes** (**fig.6**) (REF5a, 2.1&3.4). The emphasis we place on well-being is reflected in 3 of our PIs (*Booth, Isaacson, Sanz*) being Higher Education Mental Health First Aider Champions.

Our PIs are superbly supported by our chemical education team of 3 permanent (a 4$^{th}$ in 2021) and 2 fixed-term AEP staff (REF5a,1.2) who spearhead laboratory design, teaching innovation and practice, led by our Deputy Head (Education)*, Collier* (AEP Senior Lecturer). All PIs attain Fellowship of the Higher Education Academy and can complete a Postgraduate Certificate in Academic Practice (*e.g. Aldous*). We have 2 NMES-funded chemical-education PhD students (2 more in 2021).

### 2.6.Recognition and promotion

We are proactive in staff career progression, recognising research and impact achievements as well as emphasising good citizenship. We hold an informal advisory round for King's annual promotion cycle, considering all staff alongside self-nominations and assigning a mentor to help develop cases. Almost half our staff have been promoted since 2014 (2 promoted twice), with an 88% success rate for women overall and 100% for all staff nominated in 2019-20.

Our supportive process is illustrated by *Isaascon* who joined as lecturer in 2012, took 2 periods of maternity leave (2012 and 2014), was promoted to Senior Lecturer in 2016, Reader in 2019 and is NMES Associate Dean for Doctoral Studies.

NMES recently implemented **a research overheads incentive scheme (ROIS**) which returns a small % of grant overheads back to departments. We take collective decisions on **ROIS**, our **capital budget** (**section-3.4**) and space usage for strategic grant applications and equipment provision, encouraging PIs to develop our research **themes** and customise our research environment. We are also working to introduce protected time for research and impact development and a sabbatical mechanism, as staff numbers increase.

### 2.7.PDRA development

Our PDRA numbers have increased >6-fold over the REF period (**table1**) forming an active community "ChemComm" who run monthly lunches, regular research/career development events, annual PDRA-invited lecture, supervisor-free fortnightly PDRA/PGR seminars and "PDRA of the year" award. Our PDRA Tutor *Reading* chairs a PDRA committee and we have formal "Assistant Supervisor" status for significant supervision by PDRAs. All PDRAs partake in annual PDR and are upgraded as necessary in recognition of their experience. All eligible PDRAs have progressed to lecturer-level grade and open-ended contracts. King's fully implement the Concordat to Support the Career Development of Researchers (Ref5a,3.3). Every PDRA takes a minimum of 10-days professional development annually via CRSD courses *e.g.* grant preparation, pitching for funding and project management, or externally from EMBO in "laboratory management." We have a "PDRA mentoring network" to advise on well-being, careers and fellowship applications. EC PIs provide invaluable insight *e.g. Musgrave* held concurrent Marie-Curie and Harvard Environmental fellowships.

The value of our approach is shown by the success of our PDRAs, notably with 10 achieving assistant professorships abroad (**fig.7**). *Reading* exemplifies our home-grown talent; a PDRA in 2014, he won a postdoctoral BBSRC FLF (£0.3M, now Discovery) in 2016, followed by a lectureship then inaugural UKRI FLF in 2019.

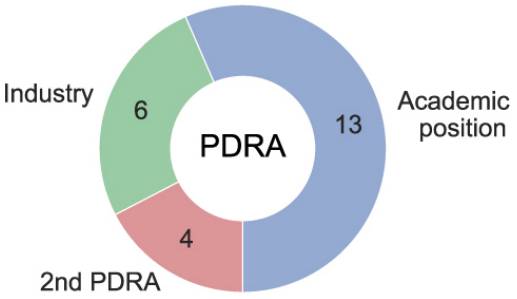


***Fig.7*_PDRA career destinations.** Academic=assistant professors/ fellowships/research manager

## 2.8.PGR funding

We have a thriving PhD community that has grown over the REF period from zero to 50 current students (**table1**) funded from a range of sources (**fig.8**). 25 students have completed their PhD (100% within 4 years). As a new department, we have been well supported by King's with start-up studentships for all staff, annual Faculty Scholarships and NMES EPSRC DTP positions. We have used these resources to establish a **"Chemistry for a Healthy and Sustainable Society" (ChemSustain) centre for doctoral training (CDT),** leveraging additional resource *e.g.* Chinese Scholarship Council (CSC). We have joint King's-Crick studentships and co-supervise on King's CDTs, *e.g.* EPSRC Smart Medical Imaging.

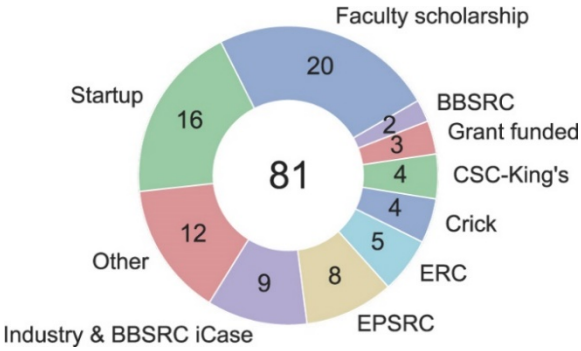


***Fig.8*_PhD Funding sources**. 75 studentships have been funded in the department from 81 sources (some have joint funding). BBSRC, including CASE are funded by LIDo.

Our alliances across King's have come to fruition in the form of 2 new CDTs with biophysics (not shown in **fig.8** as the first cohorts are about to start); Leverhulme Trust "**Mechanics of Life" Doctoral Scholarship Programme (DSP)** (£1.35M, Director *Garcia-Manyes*) and **"Biological Physics Across Scales", BiPAS** (1 of King's 3 internal CDTs to seed future EPSRC CDT applications; £1.05M, Deputy Director *Díez-Pérez*). We also have increased participation in the BBSRC London Interdisciplinary Doctoral Training Partnership (LIDo) renewal, which is now the largest BBSRC DTP (£21.7M total). We intend to expand ChemSustain and BiPAS over the next 5 years to secure additional CDT funding. Concomitantly, we are launching an MRes programme that can flow directly into our CDTs.

Depending on the doctoral training scheme, PhD students either apply to specific projects or choose projects once accepted onto a scheme, with all projects on offer being selected by an impartial, gender-balanced panel.

## 2.9.PGR development

All students are jointly supervised and have a thesis committee (supervisors plus additional PI) that supports personal development, meets regularly with the student, undertakes formal monitoring, first year upgrade viva and assists with thesis development and completion plans. Our PGR Tutor meets individually with students on a regular basis, and our department PGR officer provides daily support, enhanced by our PGR-Staff Liaison Committee. As PGR Tutor, *Isaacson* provided clear leadership around harassment, student well-being and sensitive support of students with personal issues.

PGR development is coordinated centrally by the King's CDS with a student-supervisor agreement and quarterly reporting. All students take at least 10 days of transferable skills training *p.a.*, using CDS courses including communicating to a lay audience, leadership skills, data management and presentation. Health and Safety training is provided by our in-house technical team. Students attend our departmental seminars, participate in the NMES annual poster competition and international

conferences. Several have won best poster prizes *e.g.* at a Gordon Research Conference and Colloquium on High-Resolution Molecular Spectroscopy. Students are successful, going onto careers in industry or continuing in academia (**fig.9**)

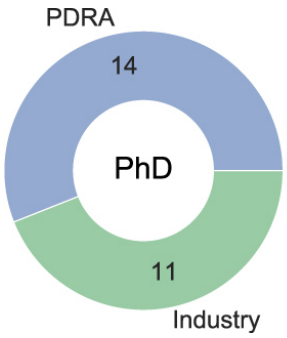


**Fig.9_PGR career destinations**

Our energetic PGR community contribute as members of our EDI committee, running social events, hosting an annual guest lecture and participating in outreach programmes. Many are enthusiastic educators and we provide support and training via our AEP team and Graduate Teaching Assistant (GTA) Tutor.

## 2.10.EDI

Our gender balance is striking for a science discipline. Our female representation is above chemistry averages from undergraduate (UG) to Professor (**fig.10**), with a 62% female technical team. We hold an Athena SWAN Bronze Award.

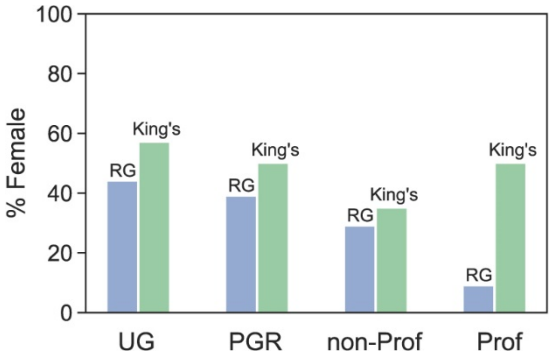


***Fig.10_*Gender balance in King's UoA8 at different career stages**, with Russell Group (RG) comparison**.** *Eggert* (female) 0.5FTE Prof not included

*Booth* sits on Academic Board, King's EDI Committee and King's Promotions Panel as Senior Peer. We have the most female academics of any department on NMES Executive Board (*Booth, Coulshed* and *Isaacson*). Within the department, women have held HoD, Deputy Head (Research), Deputy Head (Education), PGR Tutor and Senior Tutor. Our proactive searching for female candidates, sending personal invitations to tens of potential applicants per PI post, has resulted in 57% female appointees across all appointments over the assessment period. We have 50% female PGR and good representation from groups with protected characteristics (data protected), with for example "White British" being in the minority in the 2020 BiPAS intake.

We promote a flexible working environment. Our 2020 annual staff survey showed 88% of all staff (100% with caring responsibilities) work flexibly, 92% of staff felt supported by colleagues and 88% were satisfied with work-life balance. We created a parental leave handbook, including procedures for pregnancy and laboratory working, that has become the basis of King's Parents and Carers' (P&C) guidance. All our eligible staff take parental leave and 1 male PDRA has twice taken shared parental leave. We ensure staff are not disadvantaged with respect to promotion, leadership roles (evidenced by *Isaacson*) or international meeting attendance. 3 female department PIs used King's P&C Fund (Ref5a, 3.4) and have given ~100 invited lectures since 2014. Staff use 10 "keeping-in-touch" days whilst on leave and we help plan their return with lightened workloads and perform PDR within 6 months. We have secured cover or contract/studentship extensions for PDRAs/PGRs on parental or long-term sick leave. We maintain core hours (1000-1600) for meetings and seminars with protected lunch breaks and "meetings-free" Fridays.

Together with Informatics and War Studies, we developed a student module "Professional Skills for a Globalised World" covering sexism, racism and microaggressions that has been taken by 2500 students. EDI is a faculty priority with the NMES EDI Chair attending Faculty Executive Board to formulate strategic priorities including increasing BME academics, creating a EDI student forum and Women in Science (WiS) week. We fully engage with such initiatives, with 3 staff in the first cohort for forthcoming ally training and our EDI committee are expanding anonymous harassment reporting, surveys and instituting a bullying awareness day.

King's is proud to hold a Race Equality Charter Bronze Award, is a member of Stonewall Diversity Champions and the Business Disability Forum. King's hosts The Global Institute for Women's Leadership and networks in which we participate, *e.g. "*Elevate" (gender equality), "Race Equality". We serve on "Proudly King's" (LGBTQ+) committee and *Booth* is a mentor for "More Than Mentoring" and B-Mentor (Ref5a,3.4).

### 2.11.Gender analysis

Our proactive EDI committee undertake extensive analyses. 60% of our "Daniell" lecturers (since 2014) (**section-4.6**) and 41% of our seminar speakers (since 2015) were female (above RG chemistry average, **fig.10**). In line with King's REF code of practice, our REF group has gender and career-stage representation (including PDRA). The group selected outputs via blind ranking following 3 independent scores, which resulted in ~1.5 outputs returned per female PI and ~2.4 per male. The slight differences likely reflect a known gender-gap in publishing, more parental leave by our female PIs than male and errors arising from our small numbers.

## 3. Income, infrastructure and facilities

### 3.1. Research funding and strategies

Our total research funding has grown on a steep trajectory, increasing >10-fold over the REF period (**fig.11** and **table1**). This exceeds our targets that were based on REF2014 Chemistry UoA income, for a department of our size (see **fig.12**).

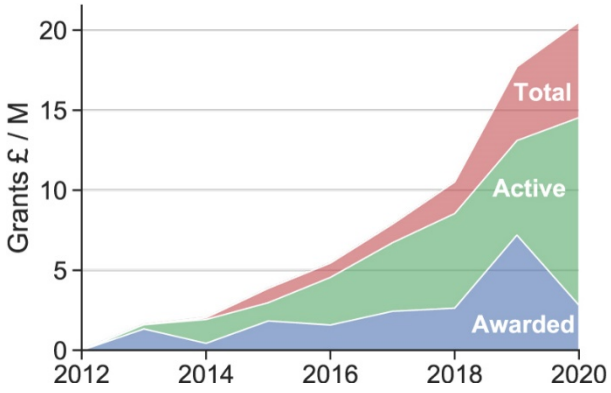


***Fig.11*_Increase in research funding.** Awarded=new grants; active=ongoing grants, total represents the cumulative total over the REF period and thus includes expired awards

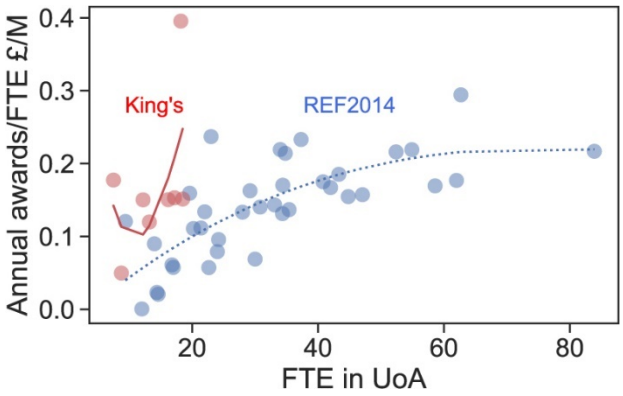


***Fig.12*_Funding comparison with REF2014 UoA8 return.** Data for King's are annual awarded grants as our PI numbers have grown. (Lines of best fit illustrate trends.)

REF2014 returns illustrate how grant awards/FTE rise with increasing FTE (**Fig.12**), with larger UoAs of >40FTE achieving ~£200K/FTE but a smaller UoA of 19FTE reporting ~£100K/FTE. Although not an exact comparison, our annual awards consistently lie above the trend of funding versus FTE size (**Fig.12**) and in 2019/20 our annual awards were ~150K/FTE (for 19FTE). Our awards are ~£190K/FTE when taking into account our average size of 16FTE over the REF period,.

Our research growth reflects the informed research culture we instigated in 2015, with a grant application procedure and checklist, and our Departmental Research Officer as a single point of contact. This good practice has been rolled out across NMES. *Booth* used her extensive grant panel experience to lead grant writing workshops and arrange tailored funding body visits, *e.g.* EPSRC visits, mock panels and 1-to-1 Wellcome Trust clinics. PIs have annual individual meetings with our Deputy Head (Research) *Wallace* to formulate personal research and impact development plans.

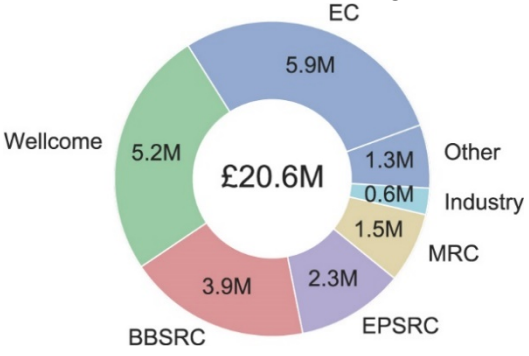


***Fig.13*_Funding portfolio**

Analysis of our department grant portfolio (**fig.13**) reveals success with ERC awards at all career stages (1 Advanced, 3 Consolidator, 1 Starting) and varied funding sources reflecting the interdisciplinary nature of our research. BBSRC and Wellcome Trust awards have

enabled us to advance **theme1,** *e.g.* exploiting biosynthetic routes to biocatalysts (*Barry-JACS*:2020), developing novel "de-toxification" approaches for potential cancer therapeutics (*Müller-JACS:*2014) and pioneering methods for membrane protein folding (*Booth/Findlay-PNAS:*2018).

Our total grant portfolio over the REF period is £20.6M. (This *includes* 50% of our joint appointment *Eggert's* awards and those of King's **Centre for Ultrastructural Imaging (CUI) Director *Fleck*** (see **section 3.5**) who is affiliated to Chemistry and returned under UoA5. Our department administers *Fleck's* grants that include equipment awards with UoA8 PIs). Collaborative awards of UoA PIs account for £5.2M (including £2.6M with industrial partners). A third of our PIs have held independent fellowships (**table3**) or 5-year grants or over the REF period, accounting for ~£12.4M of our total income and ~47% of our submitted outputs, including 4 Nature, 1 Nature Nanotechnology, 1 Science. *Bojdys* who joined in 2020 holds an additional ERC consolidator grant (held at Humboldt, Berlin) and an ERC Proof of Concept award for pre-competitive development of his battery raw materials (**section-4.4**).

Our PIs exploit our fellowship/5-year grant knowledge base to apply for long-term awards to tackle large-scale problems. As our research expands further into **themes2&3** we are focussing on EPSRC funding, with 3 lecturers who started within the last 2 years applying for New Investigator Awards. A strategic aim over the next 5 years is to grow our 3 research themes, with priorities being UKRI equipment grants and EPSRC programme or BBSRC sLoLa awards. Led by 2 PIs (one being EC) each research theme is formulating collaborative proposals with the goal of 1 such award over the next 3 years. Concomittantly, we aim to secure additional funding for our ChemSustain CDT. We are currently working with NMES to secure funding for our **Physical Science for Life Centre** (**section-1.6**). Impact development will be a core aspect of this centre, especially around new analytical methods and Science-Art initiatives. The centre will effectively couple with **Kem**Crick, our Leverhulme **Mechanics of Life** DSP and links across King's with Imaging Chemistry, IPS, King's Forensics and The Randall (**fig.3**).

### 3.2.Supporting WiS

Our high proportion of female staff (**fig.10**) reflects the supportive and inclusive environment we have embedded (**section-2.10**), cultivated by *Booth* as HoD and *Eggert* as first Deputy Head (Research). Female PIs account for ~60% of our total grant funding over the REF period, indicating no disadvantage.

### 3.3.Operational infrastructure

We work collaboratively with our professional services (PS) staff. Our Department Manager heads a team of 6, and our SPM manages growth and industrial strategy and supports strategic grant applications. Our 7-strong technical team, led by our Technical Services Manager, manage space and shared laboratories with specialised technicians supporting in-house facilities. We have 2 further electronic workshop positions and advocate the King's technical apprenticeship scheme. We have excellent computing support from 12 NMES staff that includes our Chemistry Systems Administrator.

Our department academic leads and PS teams work effectively within the excellent NMES framework for research and impact development (**section-2.4, fig.6**). In particular we exploit:

- **NMES20** that provides bespoke provision to annual PI cohorts (*Sanz* currently participating)
- **Network of Fellows** to develop strategic applications through our 7 "fellows"
- **E&E ecosystem**.

### 3.4.Organisational Infrastructure

There was no legacy of staff, space or facilities from King's original Chemistry Department that closed in 2003. Our new beginning has been vigorously supported with ~£50M investment from the university (£~46M over the REF period), including a **capital equipment budget of £4M since 2015.** We also won a £4.5M HEFCE STEM capital grant.

As a result **Britannia House (fig.2)** is configured for our interdisciplinary research with modern chemistry laboratories, fume hoods, a computational laboratory, specialised equipment, analytical

and laser laboratories, a low vibration room and workshop space. Additionally we have a floor devoted to biochemical laboratories, comprising separate cell culture and yeast rooms, cold room, biophysical, protein purification and preparation suites and a radioactivity room. We hold a Gold Laboratory Efficiency Assessment Framework (LEAF) award.

Our astute, inclusive use of **capital** has led to **7 in-house facilities** tailored to our research and impact development: Analytical Characterisation, Cell Culture, HPC (70 GPU-nodes); Microfabrication, MS, NMR and Protein Production.

An accomplishment of our recruitment strategy (**section.2.2**) has been the creation of our advanced **HDX-MS** suite, which houses a SynaptG2-Si and an automated HDX XevoG2-XS. Our "cluster of expertise" approach enabled us to assemble 4FTE combining the requisite biological sample, analytical, computational and physical technology skills. We have significantly advanced dynamic studies of physiologically important membrane proteins, reflected in 11 of our REF outputs and additional methods articles. Using £1.2M from start-up and our **capital budget** (**section.3.4**) this HDX-MS team have leveraged £4M in research funding, £35K **in-kind** contribution from Waters and 3 CASE awards. One CASE student was involved in building the new Waters Cyclic Ion Mobility Mass Spectrometer.

Additional **gifts** to the department include a scanning tunnelling microscope (£70K) to *Díez-Pérez* (from the University of Barcelona) and 200g uranium metal to *Musgrave* (from *Cloke,* Sussex).

### 3.5.Specialist facilities

To advance our research and impact we utilise a range of King's, London, national and international facilities (REF5a,1.5, 4.4) with some present and future examples highlighted in **fig.14**.

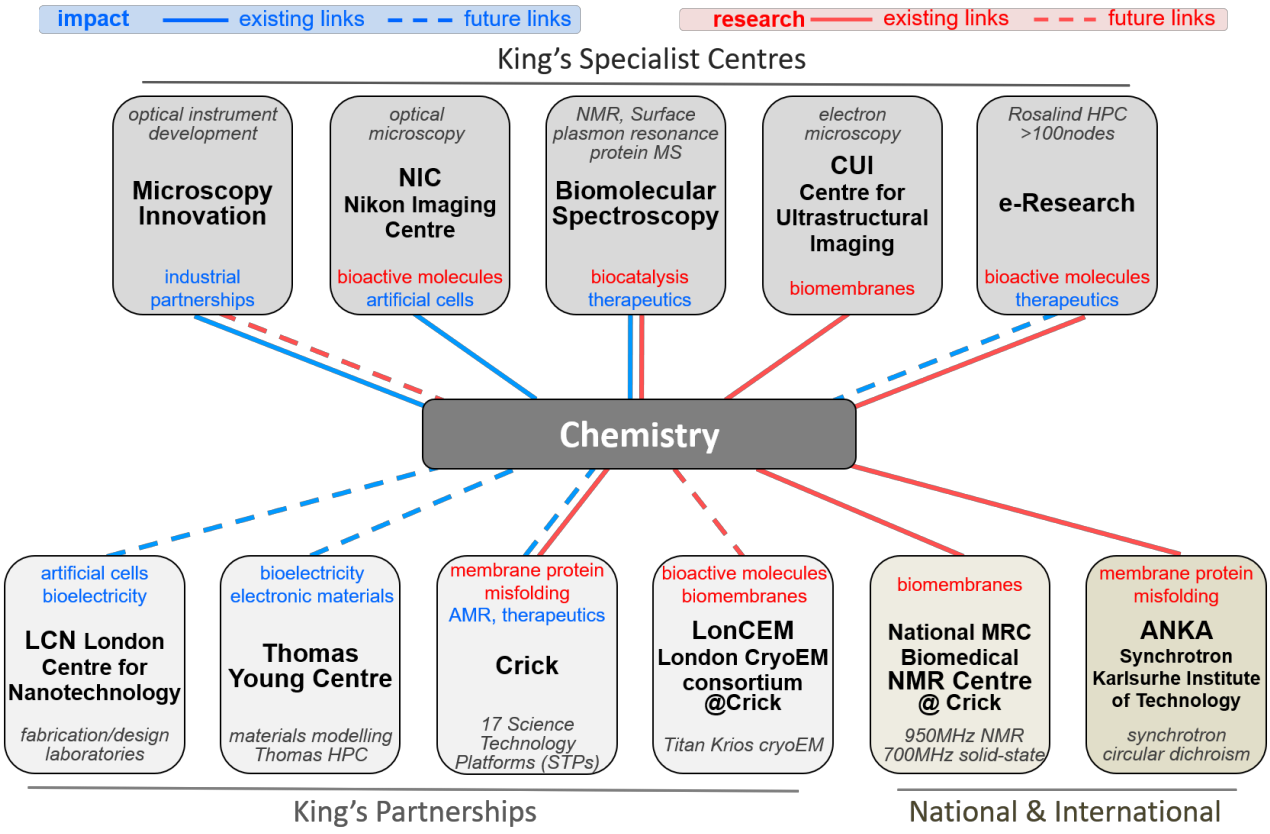


***Fig.14*_Specialist Facilities**

We benefit from King's specialist centres adjacent to us on Guy's campus including the only UK **Nikon Imaging Centre** (REF5a,4.4) that offers the latest microscopes with >£6M of investment from Nikon since 2014**.** This has enabled *Wallace* to advance his label-free imaging work of **theme1** into

**artificial cell** activities, which together with the Microscopy Innovation Centre has underpinned ~£500K of our industrial funding (*Wallace* Ipsen Biopharma, *Müller* Fluidic Analytics). King's JEOL **CUI** has >£7.5M invested in electron microscopy (EM). *Booth* and *Isaacson* work with the CUI to optimise samples for high-resolution cryoEM at LonCeM to gain molecular insight into complex protein and **biomembrane** samples. *Findlay* develops synchrotron circular dichroism tailored to these biomembrane samples, working with ANKA beamline scientists.

We employ specialist facilities strategically to lay foundations for our future goals. For example *Wallace* serves on the management board of the **LCN** that offers excellent resources for our bio-interface research. *Bojdys* and *Díez-Pérez* intend to exploit this expertise, alongside that of the **Thomas Young Centre** to reinforce our **bioelectricity** impact development. There are also opportunities to explore at the **RFI** (**section-1.1**) via our links developing correlated imaging (*Fleck*) and "Next Generation Chemistry" (*Booth*).

*Rosta* (funded by ERC Starting Grant/EPSRC EC Fellowship) and *Ulmschneider* (funded by BBSRC) have advanced their simulation methods (*e.g. Ulmschneider-JACS:*2019) and **therapeutic** studies using King's **e-Research** Rosalind HPC (recently upgraded with £1M) together with ~£130K **in-kind** HPC time on national facilities (*e.g.* Archer). Building upon this expertise base, in the next 5 years we aim to create an excellence cluster in **computational chemistry and Artificial Intelligence (AI)** to underpin expansions of all our research themes (**section-1.4**). We will align with the recent £10M King's-led, London Medical Imaging & Artificial Intelligence Centre for Value-Based Healthcare (Ref5a,1.1**)** and its Nvidia "Cambridge-1", the UK's largest dedicated healthcare supercomputer.

Our 5 **K*em*Crick** PIs who work part-time at the Crick on King's attachment programme (**section-4.1**, REF5a,1.5) are exploring novel research underpinning potential **therapeutics** using several of the Crick's outstanding 17 Science Technology Platforms (STPs). This is illustrated by *Reading* who is pioneering new **HDX-MS** approaches for **AMR** working in partnership with the Crick state-of-the-art MS/proteomics STP.

## 4. Collaboration and contribution to the research base, economy and society

### 4.1.K*em*Crick

We have engaged proactively with the Crick, notably around **chemistry of life.** *Booth* (with *Garcia-Manyes*) leads an inaugural King's-Crick satellite group, *Rosta* started her satellite group in 2018 and *Borysik, Politis* and *Reading* will lead one of the foundational programmatic satellite groups in 2021 linked to the proteomics STP. *Findlay* managed the first K*em*Crick satellite laboratories and is a "visiting scientist" acting as our central on-site contact. Additionally, we are regular visitors for seminars, Special Interest Groups and King's/Imperial/UCL "London Chemical Biology" events.

Success from our satellite groups is apparent *e.g. Rosta-Science:*2020 and *Booth* is developing new technologies for **membrane protein misfolding** studies using single molecule force methods (with *Garcia-Manyes*, *Molloy*-Crick, *Maillard*-Georgetown, USA) and high resolution and solid-state NMR (*Cabrita/Christodoulou*'s (UCL) satellite group),

In 2021 we are joined by 2 new permanent PIs as joint King's-Crick Group Leaders. *Hess* increases our **theme1** research and therapeutic impact through her innovative combination of inorganic and medicinal chemistry, and *McTernan* brings a new area of artificial molecular machinery to span **themes 1 and 2**.

### 4.2.Engagement

We have developed relationships with a range of research users and beneficiaries through research/industry collaborations, science advisory boards, industrial consulting, participating on funder panels and contributing to learned societies. We also undertake extensive schools and public engagement with some thought-provoking arts and diversity projects. A selection of these activities are outlined below.

### 4.3.Research collaborations

We make the most of collaborations across London. *Booth* is on the Scientific Advisory Board of the Imperial Institute of Chemical Biology CDT and her long-standing collaboration with *Ces* (Imperial Head of Chemistry) led to a virtual centre for artificial cell design (*fabri*CELL) in 2017, advancing **theme1** goals. We have 3 joint PhD studentships with *Salehi-Reyhani,* following his move to Imperial Department of Surgery and Cancer to advance healthcare technologies. Further close interdisciplinary links stem from *Rosta* (now UCL Physics) with *Cobb* on coronavirus therapeutic design, funded by "King's Together" (REF5a,4.2) and *Hogarth* with UCL Critical Healthcare.

Selected exemplars of interdisciplinary partnerships that advance research and impact development of our PIs include:

- **artificial cells**; *Booth* co-founded the Bristol BrisSynBio Synthetic Biology Centre (£13.5M EPSRC-BBSRC, 2014-19).
- designer peptide synthesis in the development of **therapeutics** for Duchenne Muscular Dystrophy; *Cobb* with *Foster*, Reading (£150K Harrisons Fund).
- bacterial gene expression underlying infection; *Isaacson* with *Camp* Mt.Holyoke, USA (~£900K BBSRC).
- novel broadband rotational spectroscopy in odorant design; *Sanz* with Swiss fragrance company, Firmenich (Royal Society International Exchange Grant £12K).
- **theme3 bioelectricity** work on biomolecular electron conduction; *Díez-Pérez* is advancing his ERC-funded programme via King's **Dresden-TransCampus** (£20K King's-TUDresden fund) (REF5a,1.4) and *Coote* (Australia National University; *Nature*:2016)
- Our **HDX-MS** expertise has initiated international collaborations, illustrated by *Booth/Findlay/Politis* and *Tajkhorshid* (Illinois, USA; *Nature Comms:*2020*)*.

### 4.4.Impact development and economy

Our impact development strategy is paying off (**sections-1.5&2.4, fig.6**) evidenced by the 21 patents we have filed over the REF period, with 7 being licenced (*e.g.* 1 sold to Oxford Nanopore Technologies for £10K). 37% PIs have active industrial collaborations resulting in £560K funding directly from industry and £2M in grant awards with industrial collaborations. Our 3 target impact areas have advanced as outlined below.

*Towards therapeutics* We have built industrial relationships via consultancies to Oxford Nanopore Technologies, Ipsen Biopharma, Walters, and GW Pharmaceuticals and exploited patents to found start-ups; AnywhereHPLC (*Salehi-Reyhani*) and Eve BioTek(*Ulmschneider*). 6 PIs have won King's **IAAs** (**section1.5**), including £80K R&D Challenge Fund Awards to both *Barry* and *Politis*. External IAAs provide additional resource *e.g.* Wellcome Trust SEED Award (*Politis/Booth*;£100K, 2016-17). These **IAAs** have both initiated impact development and enriched our research environment by enabling new PIs to establish their groups and start effective collaborative projects.

*Analytical science applications* Our **HDX-MS** expertise facilitates both our **theme 1 research and impact development.** We followed the King's Forensics' approach, exemplified by the DCC (**REF3**) of developing MS methodologies with the instrument manufacturers (**section-3.4**). Next steps include exploiting our expertise towards applications, developing novel workflows for the pharmaceutical industry, advised by the DCC and IPS. Moreover, the programmatic satellite at the Crick (**section-4.1**) will enable additional biomedical methodology development.

*Sustainable energy* Impact development is a key priority of **theme3 bioelectricity**. Following success with his thermogalvanic brick and start-up VBeck (**section-1.4**) *Aldous* is initiating a joint project with the department of engineering on affordable batteries. *Bojdys* engaged industry and policy stake-holders through his membership of the **Young Leaders in Science World Economic Forum** that resulted in the sale of his high-capacity anodes patent (WO2020216408A1) in 2018 to Inuru GmbH and they are currently scaling up production for assembly of rechargeable batteries.

### 4.5.Society

*Science-Art initiative* A project that epitomises our approach to challenging misconceptions about scientific creativity is led by *Isaacson*. **"Viewing the Invisible**" is a multi-media collaboration exploring common methodology between arts and sciences. Portraits of scientists (**fig.15**) were painted whilst conversations between artist and scientist were filmed, attracting >15000 views on YouTube.

***Fig.15_*Viewing the Invisible portraits**

The project launched in 2019 at the National Portrait Gallery, King's Cultural Institute and London Fine Art Studios, and featured in PLOS Biology. *Isaacson* has a unique chemistry and english literature research profile and appears regularly on podcasts *e.g.* Babbage, The Economist, BBC/ABC radio. *Isaacson* and *Booth* have both participated in ScienceFoo at GooglePlex, California; an invitation-only "unconference" across science, art and media. *Barry* appeared on Radio 4 "In our time" featuring her work on **chemistry of life**.

We are exploring possibilities for an "Artificial Life" project with *Ces*, Imperial College Advanced Hackspace, the Royal College of Arts, OpenCell biotech labs and King's Science Gallery London (REF5a,2.1).

*Invisible Careers in Science* We have developed a programme around 5 activities highlighting "invisible" careers linked to physical sciences and the power of interdisciplinary approaches in addressing global problems.

- ***Discover Science.*** Pupils interact with a wide range of academic and industrial scientists; ~100 students from ~30 schools attend annually.
- ***Summer school*** for pupils from disadvantaged backgrounds, attracting ~50 students *p.a.* Success is apparent in our UG population (50:50 male:female, 70% BAME).
- ***Open Access labs*** has welcomed 355 students from 11 schools to our teaching labs linking their curriculum to the breadth of possibilities arising from chemistry.
- ***#outtheboxthinking*** is our flagship "lab-in-a-box" programme presented at "DryLabs". In 2020 we delivered 50 at-home-boxes to pupils, school-boxes for 2070 students and 9000 "PyMol" computational kits.
- ***Public engagement*** staff and students are avid communicators, participating in the Brilliant Club, Thames Plastics Festival and working with our local Coin Street Community Playscheme.

### 4.6.Sustainability of Chemistry

*New beginnings* Our restoration of King's Chemistry Department is a significant boost for the health of UK Chemistry. Our UG numbers are buoyant and have grown to our target intake of 110, with demand increasing every year. We run 4 BSc/MSci RSC-accredited UG programmes, including "Chemistry with Biomedicine". Our first BSc students graduated in 2015. Interdisciplinarity is apparent in our degrees and "Integrated Chemistry Laboratory" modules. We expose UGs to research via a "research methods" module and summer studentships, supporting 47 UGs via King's Undergraduate Research Fellowships Scheme (REF5a,3.1) or sources such as RSC

bursaries. MSci students pursue 9-month research projects, which have led to11 student co-authored publications. Our MSci numbers have more than doubled to ~25, since the first cohort in 2015.

*Chemistry's rich heritage* We link the future potential of chemistry to its illustrious past at King's, exemplified in our modern re-incarnation of the RSC Daniell Lecture, named after the first HoD at King's in 1831. Professor Dame Carol Robinson re-inaugurated this annual public series at King's in 2014. Over 200 students regularly attend the associated open day and lectures, which have encouraged students to think about the future of chemistry with "Challenge Chemistry" in 2015. Other topics covered include "Chemistry for a Cleaner World", "The Climate System", and the "Cutting Edge of Forensic Science". We marked the 25th Daniell Lecture in 2019 with Prof Saiful Islam speaking about batteries, in honour of the invention of the "Daniell Cell". 10 Daniell descendants attended and bequeathed a bust of Daniell and his Royal Society Medals to join the original Daniell Cell at King's.

In 2016 we re-instated the Burton Lecture to showcase cutting-edge chemistry in a prominent annual King's Public Lecture.

### 4.7.Wider research influence

We are a young community that is beginning to make its mark. Much of our activity over the REF period has centred on raising our profile, emphasising that "King's Chemistry is back". *Booth* led the way taking advantage of her numerous **leadership roles**: BBSRC Appointments Board, EPSRC Strategic Advisory Network, Diamond Membrane Protein Laboratory Advisory Board, 2021 Chair of RFI "Next Generation Chemistry" Advisory Panel and member of REF2021 Assessment Subpanel 5. Her abundant grant and interview panel work over the REF period (BBSRC, EPSRC, ERC and Wellcome Trust) has inspired others to join **grant panels** *e.g. Eggert, Reading*, *Wallace* for Wellcome Trust, BBSRC and EPSRC; *Müller* on the international Schmidt Science Fellows Panel and *Brogan* for the Polish National Science Centre. *Isaacson* serves on the EPSRC Physics of Life network steering group, *Eggert* on the **Scientific Advisory Council** of the Berlin Institute for Molecular Pharmacology, *Bojdys* guides science policy via his role at the World Economic Forum (**section-4.4**) and *Reading* sits on the UKRI Foundation Future Leaders committee.

Our **EDI** prowess is illustrated by the unique international project "Catalyzing change-a diverse view of science" (**fig.16**), co-led by *Bojdys* with 5 co-publications including *Nature Chemistry* and *JACS* in 2020 together with a Nature community blog. *Booth* sat on the PLuS Alliance science working group "Transforming Women's Leadership Pathways", and *Suntharalingam* was part of the RSC diversity "175 Faces of Chemistry".

***Fig.16_*A diverse view of science**
photo abstract

We engage with **learned societies** as members of Executive Council of US Protein Society (*Booth),* British Biophysical Society (*Wallace*) and RSC Chemistry Biology Interface Division Council (*Eggert*). Many PIs are members of RSC Special Interest Groups, *Barry* is secretary for "Chemical Biology and Bioorganic" and *Sanz* for "Spectroscopy and Dynamics". *Hogarth* sits on the Accreditation and Validation Committee.

Our PIs have been recognised with independent research **fellowships** (**table3**). *Reading* was nominated by the Royal Society to attend the 2017 67th Lindau Nobel Laureate meeting. We are working to increase our **prize** nominations to add to our growing list of awards that includes: International Society of Electrochemistry Jaroslav Heyrovsky Prize (*Díez-Pérez*), RSC Norman Heatley Award (*Wallace*), Royal Australian Chemical Institute Alan M. Bond Award (*Aldous)*.

We are active in **international meetings** with UoA8 PIs giving >300 lectures over the REF period and we are contributing to organisation: Biochemical Society Meeting (*Politis, Reading*), Gordon Research Conference (*Booth*), International Conference on HDX-MS (*Politis*), International Union of

Pure and Applied Biophysics Annual Meeting (*Wallace*) and Annual RSC Chemical Biology Symposiums (*Barry, Eggert*). We serve on Journal Editorial Boards *e.g.* Current Opinion in Green and Sustainable Chemistry (*Aldous*), Biochemistry (*Eggert*), Emerging Topics in Life Sciences (*Booth*), Frontiers in Molecular Biosciences (*Isaacson*), Royal Society Interface Focus (*Booth*) and RSC New Journal of Chemistry (*Cobb*).

We encourage **collaborative PGR training** and a third of our PhD students are jointly supervised with other UK Universities. LIDo for example encompasses 8 London institutions and we aim to increase our participation in King's international schemes, including A*STAR (joint PhD programme with Singapore institutions), CSC and exploit *Bojdys'* links as Visiting Professor at Humboldt Berlin via the NMES-Humboldt joint studentships programme.

## King's Chemistry – linking the past with the future

**King's Principal & President accepts Daniell bequest**

**Celebrating our first BSc graduation**

**#outtheboxthinking**