



KNOWLEDGE CENTRE
**MATERIALS
CHEMISTRY**

Annual report
2016 – 2018

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Executive Summary

Underpinning around a third of UK manufacturing, materials chemistry enables the materials innovation required by many key industries to advance society and shape our future world. In an ever fast-paced technological world, this innovation landscape is changing extremely rapidly. This brings with it a continually evolving supply chain, which must be safeguarded so that materials innovation can remain successful and abundant in the UK.

It is for this reason that KCMC's role in accelerating R&D collaborations between business and academia in the chemistry-using industries has never been more important. The KCMC team operate in universities and institutions across the UK, offering in-depth knowledge and experience of materials chemistry in both academia and industry. This enables fruitful, collaborative innovation partnerships, leading to the development of valuable product innovations in advanced materials at reduced cost and risk.

This year has seen big change for KCMC. We have moved

our hosting from the Knowledge Transfer Network (KTN), where we operated very successfully for many years, to our new home within the High Value Manufacturing Catapult network, based at the Centre for Process Innovation (CPI) in the North East of England. We are also delighted to have gained the University of Southampton as a partner institution, further increasing our breadth of industry coverage and extending our reach to materials chemistry in the South of the UK. **KCMC welcomed two new team members; Ron Swart, Knowledge Transfer Manager for the University of Southampton and Sohail Hajatdoost, Knowledge Transfer Manager for The University of Bristol.**

The 2017/18 financial year has been another successful period for us. We have again exceeded our financial targets, yet again proving the direct impact KCMC has on business performance and the UK economy. I look forward to sharing with you just some of the highlights from the past months over the course of this annual review.



John Conti-Ramsden
Director KCMC

The value of KCMC

Within the vast innovation landscape of the UK, the Knowledge Centre for Materials Chemistry (KCMC) is unique. It draws upon its strong relationships with academia to help innovate materials chemistry and companies bring transformative products to the market. There is no other centre in the country that can do what it can do, and so we at the Centre for Process Innovation are immensely proud to host it.

With over 130 universities in the UK, it is vitally important that knowledge and expertise is available to help connect leading academic research with the needs of companies in order to deliver successful innovation. KCMC both meets this need and exceeds it. They focus the talent of others so we, as a country, can become more innovative and grow our economy. The focus on supporting and accelerating the development of innovative advanced materials is an important contribution to increasing UK productivity and is something we at CPI both fully understand and, more importantly, can assist.

Since CPI announced the hosting of KCMC in June of last year, our relationship has gone from strength to strength. As we move forward together, I have every confidence that KCMC's unique approach will continue to feed into and strengthen our abilities and ethos to support innovation in UK industry. As, despite encompassing a vast array of talent at CPI, we know there's always more to learn.

Our similarities strengthen us, just as our shared ambition drives us. Together we will greatly advance materials chemistry innovation in the UK and beyond.

Nigel Perry
Chief Executive Officer



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I have greatly enjoyed working with the KCMC team this past year. They are hugely experienced industrial scientists with insight into commercial drivers and company problems. Resident at the UK's premier universities for materials chemistry, the KCMC team have enabled me to connect CPI customers to academic experts in the materials field. The university partnerships are enabling CPI to work more closely with UKRI and play more joined up role in materials chemistry innovation.

Tom Taylor
Director of Future Business, CPI

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Innovation in Advanced Materials for High Value Manufacturing

The UK's world leading position in High Value Manufacturing is dependent on continual innovation in business and technology to remain at the forefront of, and sustain competitiveness for, future investment. A major driver for innovation in High Value Manufacturing is the materials, and underpinning materials science, which contribute to the processing, functionality and ultimately the sustainability of all manufactured goods. The robustness of UK supply chains, which can help connect innovation in the development of materials with the requirements of end users, is therefore a critical enabler to ensure the UK retains and grows this innovation capability for the long term.

The High Value Manufacturing Catapult has a key role in this for UK business by de-risking and accelerating the pace of innovation for UK manufacturing. Innovation in new, advanced materials is clearly already transforming the world that we live in, and the possibilities of influencing material properties at the atomic scale, and the convergence of science disciplines such as chemistry, physics and biology, creates technological opportunities that we in the UK are only just starting to explore in manufactured products and processes. These opportunities will be crucially dependent on evolving industry capabilities, adopting emerging technologies led by SMEs and accessing

the leading science which can be accessed through our universities. We are therefore delighted to see the transfer of KCMC hosting by the Centre for Process Innovation, the Catapult centre focussed on the process industries.

New materials innovation is massively important to the achievement of Government goals for the 'Future of Mobility' articulated in the Industry Strategy Challenge fund – and our determination in the High Value Manufacturing Catapult is to help give our industries every opportunity to deliver against these goals. And especially to work with organisations such as KCMC and its university and industry partners to secure opportunities for the materials chemistry sector which help sustain and grow their own business, and so anchor this innovation in the UK.

CATAPULT
High Value Manufacturing



Professor Sam Turner
CTO HVM Catapult

Governing Board perspective

KCMC's mission is to drive materials chemistry innovation in the chemistry-using industries by encouraging and accelerating R&D collaborations between business and academia. This collaboration is nowhere more important than within KCMC's own network. It is the connectivity between the KCMC research partners, the Knowledge Transfer Network and the Catapult centres that delivers the successful, joined-up approach to industry that KCMC strives for.

Thus, the governing board is truly delighted that the Centre for Process Innovation (CPI) is now KCMC's host. With its extensive connections throughout industry, the centre's direction will undoubtedly usher in a new stage for the KCMC, one of great opportunities, collaboration and enhanced impact.

With this transition comes another opportunity; to thank the Knowledge Transfer Network (KTN) for all the contributions it has brought to KCMC during its time as our host during the period from 2014 to 2017. Having only launched in 2009, the KTN's initiative to host came at a vital time for KCMC. From agriculture to autonomous systems, its network of businesses,

universities, funders and investors gave the centre a breadth of valuable organisations to leverage. Indeed, with KTN support, the KCMC saw a series of significant industry collaborations that delivered advances in fuel cells, advanced coatings, and novel chemical processing.

One person to thank for his contribution to the continued success of KCMC is Professor Colin Bailey, formerly Deputy Vice-Chancellor at The University of Manchester and Chairman of the KCMC governing board from mid-2014 to the end of 2016. By helping to guide the organisation at such a pivotal moment, Colin ensured that KCMC had the bold course it needed to continue on for the foreseeable future. Thanks to this, the KTN's, and now CPI's efforts, the governing board is confident that KCMC will continue to help develop and provide the necessary environment in which academia and industry, together, can contribute to the growth of a high-productivity knowledge-based UK economy.



Professor Ronan McGrath
Head of the School of Physical Sciences,
University of Liverpool.
Chair of KCMC Governing Board.

KCMC ISG Futures Meeting

Over the past twelve months, KCMC has undergone a period of significant positive change that has positioned it well for an exciting future with an expanded membership of leading materials chemistry universities and facilities. The new hosting arrangement with CPI offers KCMC the opportunity to drive better cooperation and integration of activities across the combined expertise and networks of KTN, CPI and KCMC. This is a sound basis upon which it can continue developing innovations for strengthening UK supply chains in chemicals and materials - a key area being supported by the Chemistry Growth Partnership. Working together to influence Government as a unified force, with focussed sectors identified by the Industrial Strategy Challenge Fund, will undoubtedly make a game-changing contribution to economic growth.



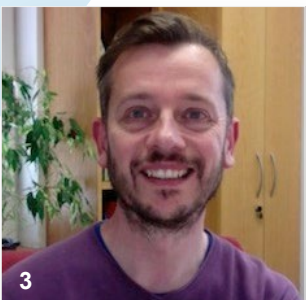
John Grasmeder
Chief Scientist, Victrex Plc

KCMC Leadership Team

1 Prof Matt Rosseinsky
Professor of Inorganic Chemistry, University of Liverpool



2 Prof Michael Turner
Professor Materials Chemistry, The University of Manchester



3 Prof Duncan Wass
Professor of Catalysis, University of Bristol

4 Prof Baljiner Kandlola
Professor of Materials Fire Science, University of Bolton

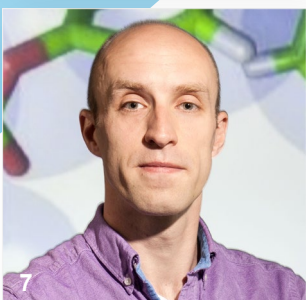


5 Prof Andrew Hector
Professor of Inorganic Chemistry, University of Southampton



6 Dr Darren Bradshaw
Associate Professor in Functional Materials, University of Southampton

7 Dr Richard Anderson
Head of Hartree Centre Chemistry and Materials Programme, Hartree Centre STFC



8 Dr Jon Helliwell
Performance Development Director, CPI



9 Dr John Conti-Ramsden
Director of KCMC CPI

KCMC Team



1 John Conti-Ramsden
KCMC Director

2 Maureen Laughton
Operations Manager

3 Mike Holmes
Knowledge Transfer Manager

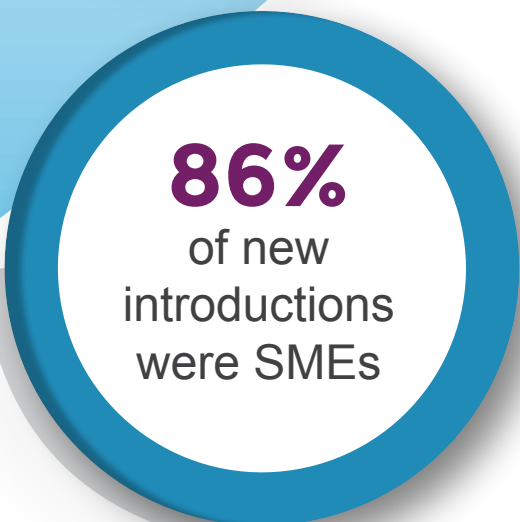
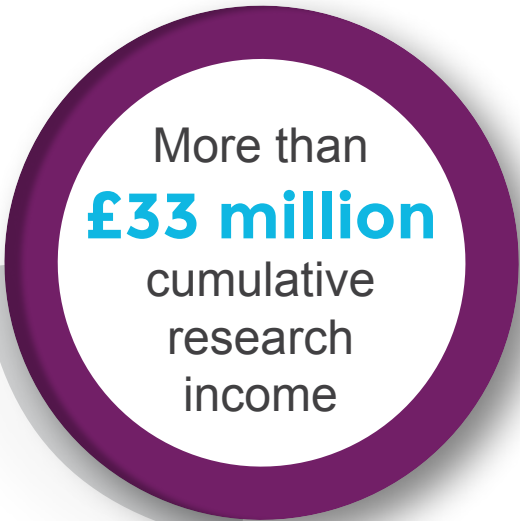
4 Steve McBride
Knowledge Transfer Manager

5 Ron Swart
Knowledge Transfer Manager

6 Sohail Hajatdoost
Knowledge Transfer Manager

KCMC AT A GLANCE

Key Highlights in the two year period to 31st March 2018 include:



Innovate UK



Innovate UK
Knowledge Transfer Network

Industrial Strategy Fund

Set up to strengthen UK science and business, the Industrial Strategy Challenge Fund (ISCF) is addressing some of the greatest issues faced by society and industry today. Materials chemistry and materials science are critical to many of these programmes; from the Faraday challenge to build a lithium battery ion supply chain for greener transport, to sustainable materials for manufacturing of the future and to broader sector challenges such as transforming construction. KCMC, with its role in connecting the innovation landscape and facilitating industry access to academic expertise, is therefore an influential force in enabling some of the biggest industrial challenges of our time to be solved.

With the recent integration of Innovate UK into UK Research & Innovation (UKRI), an even more joined up approach to innovation – taking ideas from concept to commercialisation – is now being taken. Through the ISCF and the open grant scheme Innovate UK continues to support the transformation of novel materials into finished products. As the ISCF enters its third round, it is important that KCMC continues to connect companies with the academic knowledge base in order to support the delivery of challenging innovation goals in advanced materials, and to start to develop the connections and capability for the development of new supply chains.

Malcolm Hannaby

Manufacturing Innovation Lead, Innovate UK

KTN/CGP

The Chemistry Growth Partnership (CGP) has recently refreshed its working groups on Innovation, now led by Harry Swan of Thomas Swan, and Supply Chains, now led by Richard Carter of BASF. There is currently an opportunity for the chemicals sector to create new supply chains and innovative products for batteries, particularly for the automotive sector. One very successful workshop has already taken place, bringing together chemical companies and battery manufacturers to build collaborations and commercial partnerships. The CGP has also commissioned a UK roadmap for the formulating industries, which is under development by the Knowledge Transfer Network, in conjunction with CPI's National Formulation Centre. Another opportunity, which fits well with the Industrial Strategy Grand Challenges, is for UK companies to develop and supply resins, fibres and other ingredients to satisfy the rapidly growing composite materials market.

Steve Fletcher

Head of Chemistry and Industrial Biotechnology, KTN

Delivering new collaboration has been the mission of KCMC from its very beginning. Without the shared efforts of universities, SMEs and large corporates, the innovation in materials chemistry that creates thousands of jobs and benefits many worldwide, would simply not emerge. KCMC Knowledge Transfer Managers (KTMs) are some of the most experienced brokers in their respective fields, and the relationships they have with partners are the lifeblood of our work.

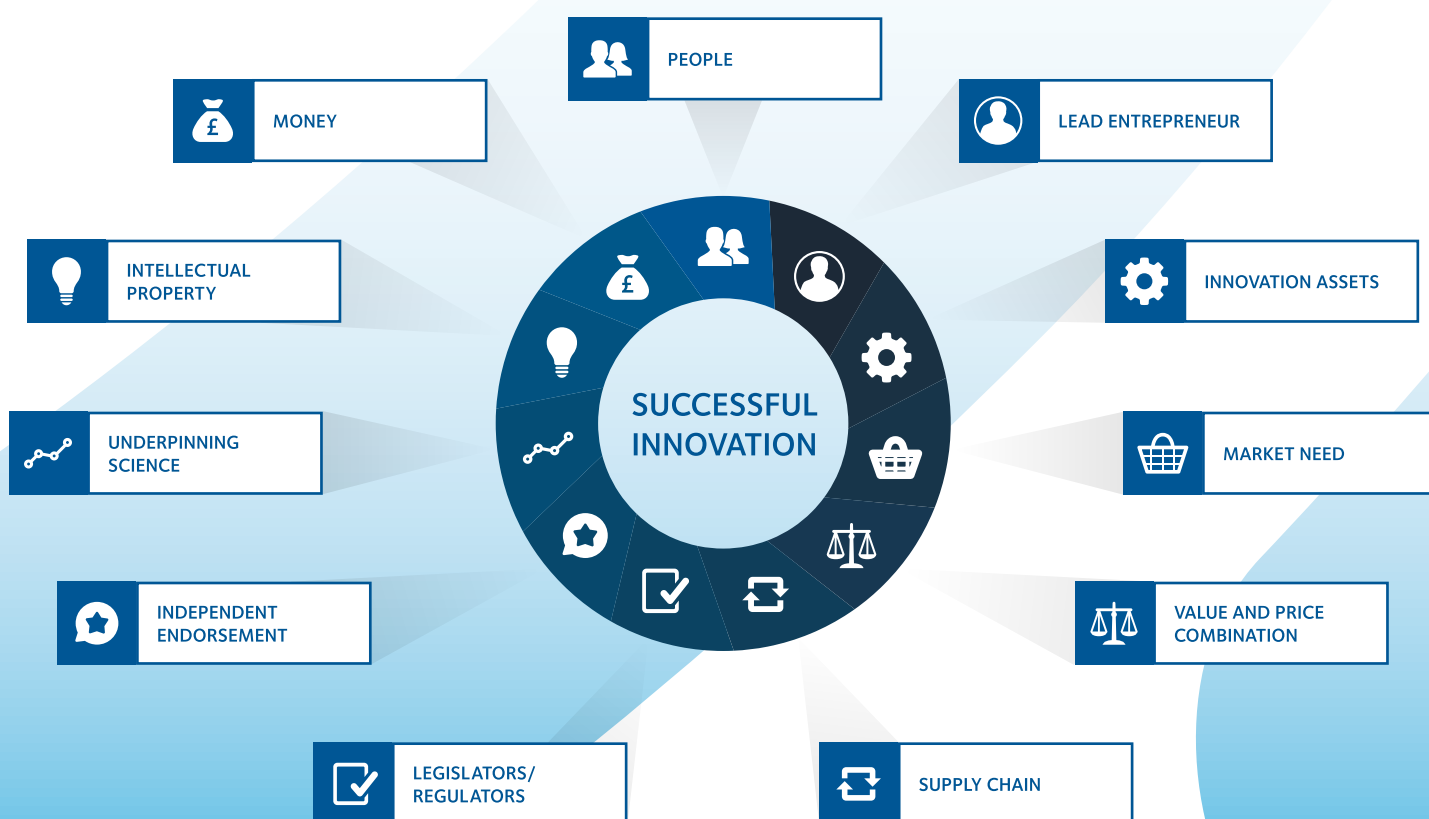
Now, as partners of the Centre for Process Innovation (CPI), KCMC is able to take this collaborative work to the next level. Since teaming up with CPI last year, KCMC can now offer many unique benefits and new capabilities, such as access to facilities and even more specialist materials expertise.

One particular asset that has brought considerable excitement to KCMC is the Innovation Integrator®. One of CPI's most insightful business tools, the registered model is based upon the experience CPI has gained over the last thirteen years in

supporting its clients. The model allows businesses to validate and establish robust strategies by highlighting product, process and technology gaps that must be addressed to enable progression from invention to commercialisation.

The model helps to create a plan to de-risk and lower the cost of innovation, while building a company's value and investor confidence by identifying potential barriers and bottlenecks to growth across eleven factors. This includes factors such as market need, innovation assets and organisational intellectual property.

The unique partnership between CPI and KCMC will create value for the UK's materials chemistry sector as a whole through the provision of innovation services and expertise, as well as establishing the ability to develop people with a systematic innovation approach. With CPI's capabilities now an integrated part of the KCMC offering, our role in facilitating innovation is set to enhance significantly.



CONNECT

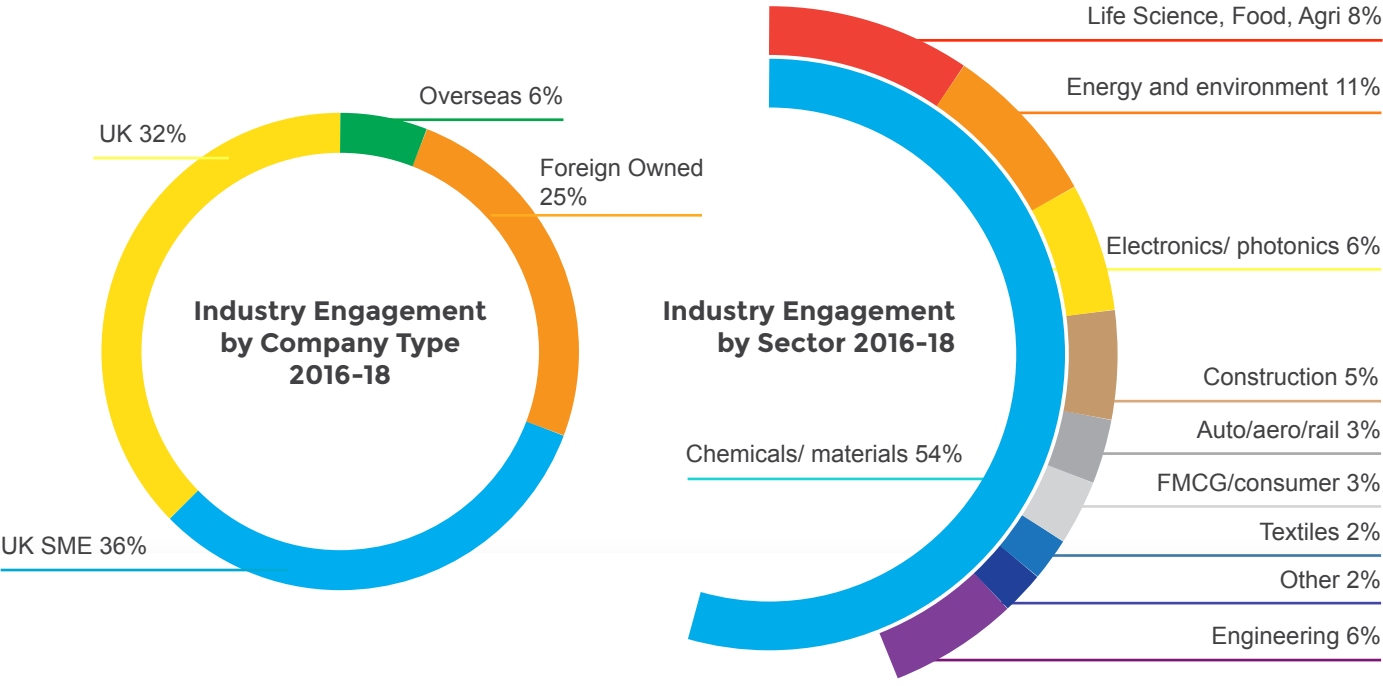


Drawing on major centres of materials chemistry expertise in the UK, KCMC drives new areas of innovation in advanced materials by facilitating meaningful collaboration between businesses and academia. In the two year time period from April 2016 - March 2018, KCMC progressed 407 total industry engagements from diverse industry sectors between SMEs, UK PLCs, foreign owned companies with UK R&D and overseas companies.

The balance across industry sectors remains very consistent compared to previous years, with 54% of KCMC's initial industry engagements occurring with cross-sector chemicals and materials companies, and 46% broadly spread across downstream industry sectors.

The majority of KCMC's business engagements occur with SMEs (38%), with larger UK companies, and foreign owned research centres or overseas companies, both representing around a third of our business engagements.

Of the businesses engaged in the two year period, 60 businesses were new to the KCMC research partners. The vast majority were SMEs and start-ups, although significantly, eight businesses were major corporates seeking to test and develop new materials ideas in their supply chains.



UNDERSTAND



When making industry engagements, KCMC takes the time to listen and understand the specific challenges and needs faced by companies in new materials innovation. This helps determine how KCMC university partners and wider innovation networks can be of maximum benefit to companies, enabling challenges to be overcome, and for business goals to be achieved.

KCMC is an active player in the UK materials chemistry and materials science industries. In addition to one-on-one discussions with companies and universities, the KCMC team actively participate in Innovate UK industry workshops where materials chemistry has a role to play in delivering innovation. Here, the KCMC team often play a leading role in drawing together an understanding of chemistry

challenges for companies across sectors. KCMC's Industry Steering Group then address these challenges, with discussions on the longer-term industry needs and opportunities for collaboration.

For example, in the fast developing field of next generation materials for long fibre reinforced composites, KCMC led early industry discussions in support of the industry growth objectives for the UK Composites Leadership Forum.

FACILITATE



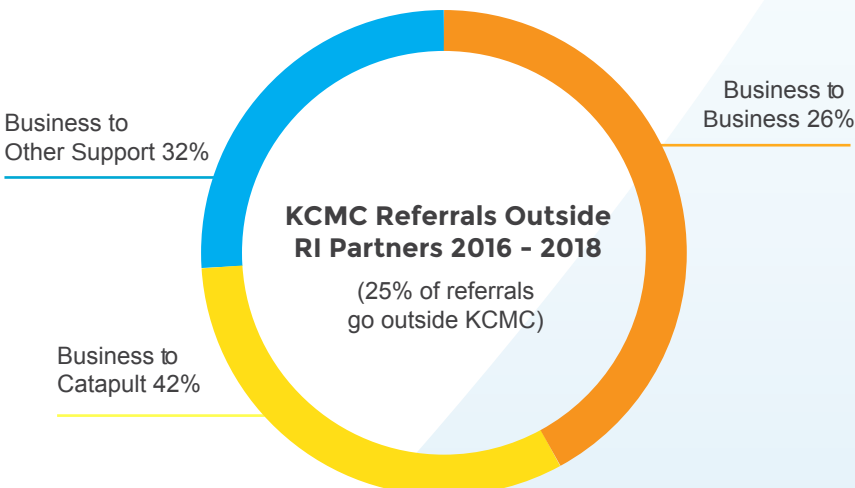
KCMC offers connections to a large and structured multi-sector materials network. We leverage the knowledge of our network, our partners and the wider innovation landscape to overcome challenges for businesses.

We ensure the most appropriate, meaningful and mutually beneficial collaboration between a company and one the KCMC partners, or even beyond the KCMC network when there is not an immediate fit. In any one period, typically 35%-40% of initial business engagements lead to confidential project discussions with the KCMC research institution partners, and around 25% lead to referrals outside of these partners.

KCMC works closely with KTN and industry network colleagues in this area, and now also has direct access to the skills and capabilities of the UK's Catapult centres. Over the period from

April 2016 to March 2018 referrals outside of KCMC's academic partners accounted for around a quarter (98) of industry engagement outcomes.

In 2017-2018, there has been significant focus on deepening the networks and connections between KCMC research partners and the Catapult centres, including the Centre for Process Innovation (CPI), the National Composites Centre (NCC) and the Offshore Renewable Energy Centre (OREC). Funding from the High Value Manufacturing Catapult for the Materials Innovation Translator programme has greatly facilitated this, both by supporting interactions between KCMC and technology leads within the Catapult centres, and by helping KCMC research partners build industry responsive capabilities in key target technology areas aligned with UK Research and Innovation (UKRI) strategy priorities.



DELIVER

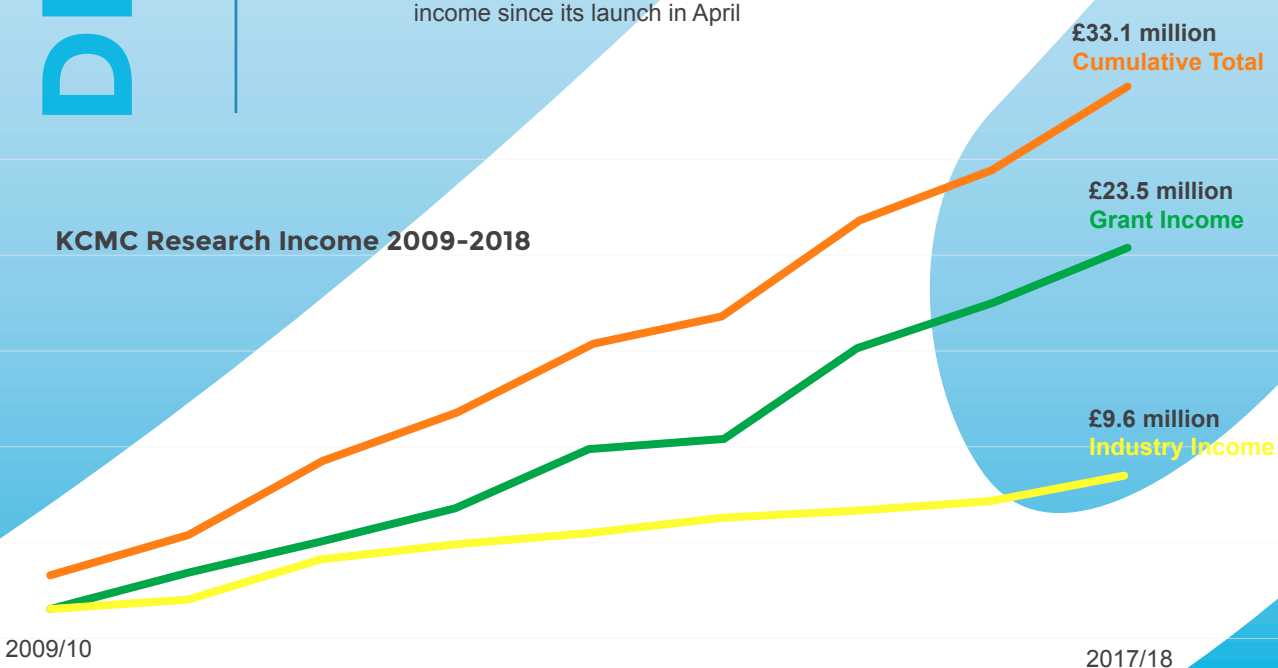


Ultimately, the measure of success for KCMC is in delivering research collaborations that provide tangible benefit to industry, and impact income to research institution partners. Thanks to our highly credible and trusted team, alongside our successful model strongly validated by independent review, we're able to support the creation of innovative products that add significant economic commercial value to the UK.

This financial year, KCMC yet again outperformed expectations, reaching £33 million total collaborative research income since its launch in April

2009, with £9.6million accounted for by industry income. This fantastic achievement demonstrates the value of KCMC's knowledge transfer excellence in materials chemistry, and the direct impact this has on business metrics and the UK economy in general.

For examples of how we've delivered valuable results through our collaborations with industry and academia, make sure to explore our case studies on page 19.



PARTNER UPDATES



UNIVERSITY OF
LIVERPOOL

The University of Liverpool is leading the field of modern materials chemistry research and pioneering approaches towards collaboration between academia and industry. A particular highlight from the past year was the opening of the University's Materials Innovation Factory (MIF). This world-class open access facility, houses state-of-the equipment for materials chemistry research bringing together Liverpool's strength in materials chemistry with computer science and physics, highlighting the importance of cross-disciplinary collaboration in the discovery of new materials.

The MIF is also home to an arm of the Henry Royce Institute, Royce@Liverpool, which focuses on the core research area of Chemical Materials Design. Liverpool is a key partner to the Faraday Institute with leading academics involved in solid state battery materials, battery recycling, battery characterisation and degradation, providing underpinning science to support the future mobility challenge and move to zero emissions vehicles.



The University of Manchester

Extensive ongoing investment by The University of Manchester will ensure that The University continues to be a global research beacon for innovation in advanced materials. With £248 million worth of investment projects currently live, The University is at the forefront of worldwide research for a wide range of fields, including advanced materials research designed to serve both the nuclear energy and biomedical sectors. Manchester is also a global leader in both fundamental and applied research for 2D materials such as graphene, which was isolated at the University in 2004.

Working with a range of industrial partners remains a top priority for the University, and KCMC works closely with The University to help deliver mutually beneficial collaboration with companies. The University hosts the £64 million BP International Centre for Advanced Materials (BP-ICAM) and the £235 million Henry Royce Institute, the national body for research and innovation in advanced materials. KCMC is currently working with the Royce to explore how KCMC can support the interaction of the Institute across a number of industrial sectors.



University of
BRISTOL

Having one of the largest Chemistry Departments in the UK, the School of Chemistry at the University of Bristol has strengths in composite chemistry, catalysis, synthetic biology, materials for energy and soft matter and colloid science. A fantastic asset to the KCMC, its strong ties to the National Composites Centre and many other industrial sectors also mean that Bristol Chemistry has a range of strong industrial relationships which the KCMC can leverage. These contacts range from partners in the flexible electronics sector to those working in biosynthesis, all of which are valuable to future innovation.

Although just two years old, KCMC's partnership with Bristol is already producing promising new composite materials for a variety of applications in the automotive and aerospace sectors. With these, and many more exciting collaborations in the pipeline, this exciting partnership is set to be one of longevity, prosperity and innovation.



Hartree Centre
Science & Technology Facilities Council

The STFC Hartree Centre, now in it's 5th year, received a royal seal of approval this year, with the Duke of York opening the new Hartree Centre Building. The Hartree Centre continues to develop its expertise, knowledge and partnerships.

In collaboration with Atos, the Hartree Centre brought the first Bull Sequana supercomputer to the UK. The collaboration includes the purchase of the UK's first Bull Sequana X1000 supercomputer system, one of the most powerful in the world, capable of performing 3.4 quadrillion calculations per second. This compute resource will enable academic and industry organisations to try out the state-of-the-art technology and develop applications using the latest advances in artificial intelligence and high performance data analytics.

A particular highlight of the last year involved the Hartree Centre, IBM Research and Unilever committing to work together under a three-way Joint Development Agreement to develop new computer software and advanced modelling capabilities that will transform the competitiveness of UK industry. The first joint project under this agreement is to create a powerful computer simulation capable of predicting how liquids will mix together, which will enable Unilever to develop better products, faster. Other projects are to follow.

During the last year, the Liverpool City Region acknowledged the capabilities in high performance and cognitive computing capabilities in the Hartree Centre via the Science and Innovation Audit (SIA). This was in addition to the materials chemistry capabilities of the Materials Innovation Factory at Liverpool, and highlighted exciting opportunities for the future via collaboration to deliver world-class innovation.



The Institute of Materials Research & Innovation (IMRI) at the University of Bolton is a leading centre in applied materials science and novel sensor based technologies. IMRI, functions very much in line with KCMC with its endeavours to cultivate materials research and innovation from academia and bring it into industry.

The University of Bolton is also home to exemplary fire materials research; arguably one of the most important research fields with regards to practical public safety. The fire materials group at Bolton is a leading body in the field of fire retardancy and flammability studies and is a fantastic asset to the KCMC network. It has a long track record of research into textile and fibre heat resistance, burning behaviour, and novel flame retardant systems for bulk polymers. Bolton's capabilities are increasingly important within construction, energy storage and adoption of composites in transportation.

PARTNER UPDATES

UNIVERSITY OF Southampton

KCMC is delighted to welcome the University of Southampton as its newest affiliate. This partnership will bring many benefits to the network, including an array of industry links forged through multiple centres of expertise and collaboration, along with the University's excellence in advanced materials research.

The Department of Chemistry has a strong focus on developing novel materials for commercialisation and improving sustainability. With over 100 members of research staff, there is a wide range of research spanning electrochemistry, computational systems chemistry, magnetic resonance, functional inorganic materials and supramolecular chemistry, and organic synthesis and flow processing.

Research staff at Southampton are developing new NMR techniques to broaden its applications across the physical and life sciences. Major current projects include extending the time-scale over which NMR signals can be observed and investigating the structures of complex functional materials, including superconductors and catalysts.

University-wide collaboration

The advanced materials teams within the Department of Chemistry work closely with other University disciplines. The National Centre for Advanced Tribology at Southampton is a multidisciplinary hub for studying interacting surfaces in relative motion, creating a new wave of technology that underpins mechanical engineering, microsystems and biomedical engineering.

The University of Southampton is also home to the Zepler Institute, the largest photonics and electronics institute in the UK that develops technologies across the fields of optoelectronics, electronics, quantum technologies, physics and neuroscience.

There are also strong collaborations with researchers in Electronics and Computer Science, including using the application of screen, inkjet and dispenser printing to create e-textiles. The μ -VIS X-Ray Imaging Centre also offers dedicated computed tomography across multiple disciplines.

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Chemistry at Southampton has a strong tradition in innovation and enterprise. We are excited to become a partner of KCMC as we believe this offers a great opportunity to accelerate the impact of our research through partnerships with both large industry and SMEs, to ensure that our work has real-life benefits.

Gill Reid

Head of Chemistry,
Professor of Inorganic Chemistry
University of Southampton

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Electrochemistry

Research and innovation interests within this group include exploring new battery and super-capacitor technology and investigating the potential of new electro-catalysts. Previous research resulted in the creation of Ilika - a successful company in the electronic materials sector. Southampton is a founding partner of the [Faraday Institution](#) which will be key to developments in batteries and vehicle electrification for the UK.

The group is a centre of excellence in developing electrodeposition for the fabrication of high quality semi-conductors, nanostructured electrodes and chalcogenide materials through the ADEPT programme grant.

Computational Systems Chemistry

The University is at the forefront of multiscale modelling research, taking advantage of its state-of-the-art supercomputer, Iridis 5. Notable strengths are in modelling heterogeneous catalytic processes and developing molecular simulations for the study of proteins and related systems of biological importance.

Magnetic Resonance

Research staff at Southampton are developing new NMR techniques to broaden its applications across the physical and life sciences. Major current projects include extending the time-scale over which NMR signals can be observed and investigating the structures of complex functional materials, including superconductors and catalysts.

Functional Inorganic, Materials and Supramolecular Chemistry

By synthesising diverse classes of inorganic, solid-state and supramolecular materials, research in this group aims to advance technology and innovation and improve sustainability. Two particularly exciting areas of research are in solid-state materials chemistry using mixed-anion phases for thin film photocatalysts and the development and processing of porous inorganic and hybrid materials, including designing novel framework architectures for targeted single-site catalysis.

Commercial and industrial links

The University provides bespoke services to both the commercial and industrial communities, using high-spec equipment and technical expertise to offer a comprehensive range of analytical solutions. Services offered by Southampton Chemistry Analytical Solutions include extensive NMR, mass spectrometry and X-ray diffraction using the world's brightest molybdenum lab source. Single crystal X-ray diffraction is also provided via the EPSRC UK National Crystallographic Service in conjunction with Diamond Light Source.

The Advanced Composite Materials Facility

Established in 2014, this unique facility is at the forefront of developing and incorporating advanced materials for a wide range of applications.

Evaporative physical vapour deposition is used to identify and optimise materials, and the same thin film methodology has been implemented in a vacuum cluster tool allowing the incorporation of these materials into device structures for microfabrication on 150mm wafers. Present collaborations involve Ilika Technologies in the production of solid state thin film batteries, and a number of academic groups within and outside Southampton through EPSRC funded programs on Metadevices and Metasystems, Chalcogenide Materials, Tuneable Dielectrics for 5G Applications, and Energy Conversion Materials.



Gill Reid
Head of Chemistry,
University of Southampton



Darren Bradshaw
Associate Professor in Functional
Materials - University of Southampton



Andrew Hector
Professor of Inorganic Chemistry
University of Southampton

CPI-University interactions

Universities are important partners for CPI in the innovation journey from invention to commercial market. The process of invention is largely located within the university environment, and so the interface between universities and the Catapult network is integral.

CPI previously conducted projects with university partners, but, until recently, had not fully realised the opportunities that meaningful academic engagement could bring to the organisation. When the opportunity arose to work with KCMC, and its extensive academic partner base from leading materials, formulations and electronics groups from across the UK, CPI quickly took the chance.

CPI can now successfully support the development of more meaningful interactions with the academic sector. There is a future opportunity for CPI to apply its unique expertise and up-scaling facilities to one KCMC partner, The University of Bristol, to assist in the development of novel photovoltaics, and many more KCMC collaborations are on the horizon. Plus, moving forward, the model can be used more widely within the Catapult network to support organisations that do not have direct links to universities.



Jon Helliwell
Performance Development Director

National Strategy, Advanced Materials and the Henry Royce Institute

The Henry Royce Institute is a £235 million research centre for research and innovation of advanced materials. The open access institute works with the UK's leading materials scientists to drive research, deliver real solutions and make a fundamental difference to the UK economy.

The institute's hub is based at The University of Manchester with spokes at the founding partner universities of Sheffield, Leeds, Liverpool, Cambridge, Oxford and Imperial College London, as well as the UK Atomic Energy Authority and National Nuclear Laboratory. All partner institutions offer a unique and wide-ranging set of state-of-the-art facilities and expertise, from atomic force microscopes with in situ analysis, to bioadditive manufacturing systems and electrical characterisation suites.

KCMC is working with the Royce to identify where there are opportunities for materials chemistry to make major contributions to the development of new advanced materials. Work to date is indicating that the best opportunities will be in the Royce

research areas of 2D Materials, Material Systems for Demanding Environments, Chemical Materials Design and Biomedical Materials. There may also be additional opportunities in Energy Storage and Materials for Energy Efficient ICT.

In addition to identifying opportunities for materials chemistry to contribute to wide-ranging advanced materials applications, KCMC is also working with the Royce to establish how it can best support the Royce's engagement with UK-based companies. Over the last 10 years KCMC has **successfully developed and used the 'Connect, Facilitate, Deliver' model** for engagements between the KCMC partner universities and knowledge intensive business in the UK. It is possible that this model may be able to complement the existing arrangements for business engagement within the Royce.

Through an ongoing interaction with the Royce, KCMC will help to identify opportunities for the UK's materials chemistry expertise to drive advanced materials innovation.

HENRY : : :
ROYCE : : :
INSTITUTE



The architect's view of The Henry Royce Institute supplied by The University of Manchester

CASE STUDIES

Connections that breed connections

The connections made between advanced materials leaders within the UK are often the roots of materials chemistry innovation. But these connections are not always made as first imagined – a maxim that was recently proven during a project between KCMC's partner, the University of Southampton, and Carrington Textiles, the largest producer of workwear fabrics in the UK.

The challenge

The discussion began when two Southampton academics approached KCMC Knowledge Transfer Manager, Ron Swart. They presented their plan of producing a range of functional electronic textiles, for clothes that can emit light and change colour, and inquired about possible industry partners.

The outcome

Acting as a broker between this research proposal and industrial capabilities, Ron secured Carrington as a partner thanks to the potential of the project in improving High-Vis jackets and safety wear.

As a consequence of this first connection, KCMC then proposed another project to Carrington concerning thermo-electric textiles for clothes that can harvest energy from body heat. Carrington again took interest, and together with the University of Southampton, have co-funded a PhD studentship to explore the topic.



CARRINGTON
TEXTILES

CASE STUDIES

Facilitating mutually beneficial partnerships

By leveraging the capabilities of our network partners, at KCMC we ensure the most appropriate, meaningful and mutually beneficial collaborations between businesses and academia. After previously working with speciality chemicals company, Croda, KCMC's Knowledge Transfer Manager at the University of Bristol noticed a possible opportunity for academic collaboration.

The challenge

Two years ago, KCMC commissioned a postdoctoral researcher at the University of Bristol to carry out first stage studies with multiple different companies. As a reliable and trusted expert in the field of materials chemistry innovation, KCMC identified that Croda had both great technology, and a need for future research.

The outcome

A relationship between the University and the company was initiated and enabled the postdoctoral researcher to carry out a three-month study on the possibilities of the confidential technology. Following the great success of the initial collaboration, the University has now developed a productive partnership with the company and received funding from the company for a PhD research study to further develop the technology of interest by Croda. A final decision from the funding body is awaited.



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