



OSCAR OXFORD NEWSLETTER 041 DECEMBER 2020

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ver exciting progress 2020 in Review: OSCAR rises above an eventful 2020

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2020 in Review: OSCAR rises above an eventful 2020 to deliver exciting progress

It is impossible to reflect upon the past 12 months without considering the coronavirus pandemic and the impact it has had on all our lives. For OSCAR in particular, as an international research centre, the immediate and lasting travel restrictions forced fundamental changes to our operation model. Through hard work, determination and team spirit, OSCAR was able to adapt to these challenges and not just persevere but continue to make strides in research and cooperation. As 2020 has finally run its course, OSCAR looks back on the past twelve months and celebrates material achievements and gains in momentum. In this special review edition of our monthly newsletter, we will look back on OSCAR's key achievements in pandemic response, research excellence, talent introduction, and impact generation to signpost its progression over the past year.

OSCAR steers safely through coronavirus disruptions

Coronavirus caught everyone off guard in 2020. Trepidation, frustration and uncertainty cast a shadow over the Chinese Spring Festival celebrations, sending shockwaves through the economy and day-to-day life. At the height of the pandemic, a special pandemic control task group led by OSCAR General Manager Leah He was formed, wasting no time in taking emergency response actions. The task group, consisting of Head of Office, Head of Building Services, HSE Supervisor, Facilities Supervisor, Administrative Coordinator and EA to General Manager, was the first to return to the premises to create and ensure new protocols and measures to support a safe and orderly resumption of work onsite at OSCAR. Throughout, the team remained dedicated to promoting staff health and wellbeing.

OSCAR's crisis management proved efficient. Research activities at OSCAR were spared from excessive detrimental delay with the majority of researchers back in Suzhou on 17th February and adapting to new patterns of teamwork.

OSCAR research groups growing and productive

Despite OSCAR's efforts to recruit full-time researchers from around the globe being thwarted by the pandemic, OSCAR's research capability continues to grow with the recruitment of 9 new researchers in 2020. OSCAR is delighted to welcome these talented researchers to its thriving research community to drive innovative research in AI for healthcare, optoelectronics, energy storage and conversion, environmental bioengineering, enzyme evolution and bio-catalysis and organic synthesis.



Dr. Jessie Liu, Research Scientist, Prof. David Clifton's group



Dr. Ziyue Xiong, Research Scientist, Prof. Jeremy Robertson's group





Dr. Zhongqing Liu, Research Scientist, Prof. Mauro Pasta's group



Geng He, Assistant Research Technician, Prof. Paul Stavrinou's group



Dr. Yushu Li, Research Scientist, Prof. Luet Wong's group

Dr. Yun Hu, Research Scientist, Prof. Paul Stavrinuo's group



Kinxin Chen, Laboratory Assistant, Prof. Mauro Pasta's group

> Wenwen Tao, Assistant Research Technician, Prof. Paul Stavrinou's group



OSCAR's New Researchers in 2020

OSCAR's research activities continued, adapting to restrictions when necessary, making notable achievements in a uniquely challenging year. PIs led their on-the-ground research groups in Suzhou remotely from UK, steering research efforts which produced 12 research papers, three patents and one new spin-out in the last 12 months.

Papers:

- are joint authors for OSCAR.
- Prof. Mark Moloney are joint authors for OSCAR.
- in Gene: X.
- an OSCAR affiliation.
- Catriona Inverarity and Prof. Wei Huang are joint authors with an OSCAR affiliation.
- With an OSCAR affiliation, Dr. Yang Yang, Senior Research Associate in Prof. David Clifton's group, Classification and Mutation Ranking" in Frontiers in Microbiology.
- dichalcogenides (Pt, Pd, Se, S) for electronics and energy applications".
- (CYP102A1)".



• Prof. Mark Moloney's group published a review article "Diazo and diazonium compounds for surface modification" in Tetrahedron Letters. Dr. Dandan Wang, Dr. M. Kamran Khan and Prof. Mark Moloney

> Prof. Mark Moloney's group published a review article "Functionalised Nitrogen Heterocycles and the Search for New Antibacterials and Bioactives" in Synthesis. Dr. M. Kamran Khan, Dr. Dandan Wang and

Senior Research Scientist in Prof. Zhanfeng Cui and Hua Ye's group, Dr. Hui Wang, co-published a new paper "ALCAM (CD166) as a gene expression marker for human mesenchymal stromal cell characterisation"

• Prof. Wei Huang's group and Prof. Zhanfeng Cui's group jointly published a research article "*RT-LAMP* for rapid diagnosis of coronavirus SARS-CoV-2" in Microbial Biotechnology. Prof. Wei Huang, Dr. Huidong Jia, Dr. Yun Wang, Yida Zeng, Mengmeng Ji, Dr. Hui Wang and Prof. Zhanfeng Cui are joint authors with

Also by Prof. Wei Huang's group and Prof. Zhanfeng Cui's group, "Development of a rapid test kit for SARS-CoV-2: an example of product design", was printed in Bio-Design and Manufacturing. The article arises from their work designing and developing a rapid test kit to detect SARS-COV-2 (COVID-19). Prof. Zhanfeng Cui, Dr. Hui Wang, Dr. Huidong Jia, Dr. Yun Wang, Yida Zeng, Mengmeng Ji, Dr. Weizhi Liu,

published a research article titled "Multi-Label Random Forest Model for Tuberculosis Drug Resistance

Enqi Chen, a Research Technician in Prof. Mauro Pasta's Energy Storage and Conversion group, published a review article in Materials Today Advances. The article is entitled "2D layered noble metal

Research of Professor Luet Wong's group was featured on the cover of ACS Catalysis. The article is titled:" Oxidative Diversification of Steroids by Nature-Inspired Scanning Glycine Mutagenesis of P450BM3

- S In collaboration with researchers from the School of Chemistry and Pharmaceutical Engineering, Qilu University of Technology (Shandong Academy of Sciences), OSCAR Deputy Director and PI Prof. Mark Moloney published a research paper entitled "Carbene modification and reversible crosslinking of silver nanoparticles for controlled antibacterial activity". Scientific Reports 10 (1): 1-9.
- OSCAR PI Prof. Rama Cont in the new Mathematics group contributed to research efforts to investigate the COVID-19 pandemic, described inan article entitled "Modelling COVID-19 contagion: Risk assessment and targeted mitigation policies".
- OSCAR PIs Prof. Ron Roy and Prof. Jason Raymond, who lead the Acoustics and Optics research laboratory, published a joint paper entitled "The influence of droplet concentration on phase change and intertial cavitation thresholds associated with acoustical droplet vaporization" in The Journal of the Acoustical Society of America together with collaborators in the Key Laboratory of Modern Acoustics (MOE) at the Collaborative Innovation Centre of Advanced Microstructure, Nanjing University.
- Dr. Jingsong Huang, Senior Research Scientist at OSCAR's Optoelectronic Technology Laboratory (OeTL) led by Prof. Paul Stavrinou, published a joint paper entitled "Universal and versatile morphology engineering via hot fluorous solvent soaking for organic bulk heterojunction" in Nature Communications. This working and resulting publication was a result of collaboration with groups in Shanghai Jiao Tong University, Suzhou Institute of Nano-Tech and Nano-Bionics CAS, East China Normal University, and Bruker (Beijing) Scientific Technology Co., Ltd.

Patents:

- OSCAR filed its first patent application, "Primers for detecting novel coronavirus SARS-CoV-2 and test kits, methods and applications thereof", stemming from Prof. Zhanfeng Cui and Prof Wei Huang's development of a quick, accurate and easy-to-use test for SARS-CoV-2.
- OSCAR's Optoelectronic Technology Laboratory (OeTL) led by Prof. Paul Stavrinou (Oxford) and Prof. Donal Bradley (Visiting Academician, KAUST) developed new materials to promote perovskite technology. Based on this research, the group have filed their first patent application "Auto-encapsulating organic blends, and perovskite precursor materials and derivatives thereof".
- Novel research by OSCAR's Surface Chemistry group has led to the creation of one patent. The group, comprising Research Scientists Dr. Muhammad Kamran Khan and Dr. Dandan Wang and led by Deputy Director Prof. Mark Moloney filed OSCAR's third patent, "Surface Functionalized Materials and Modified Materials and Preparation Method and Applications Thereof" in September.

OSCAR research groups on the ground in Suzhou



RESEARCHERS IN OSCAR'S ENERGY STORAGE AND CONVERSION GROUP



RESEARCHERS IN OSCAR'S OPTOELECTRONIC TECHNOLOGY (OETL) LAB



RESEARCHERS IN OSCAR'S ORGANIC, INORGANIC AND SURFACE CHEMISTRY GROUPS

OXFORD SUZHOU CENTRE FOR ADVANCED RESEARCH



RESEARCHERS IN OSCAR'S ENVIRONMENTAL AND SYNTHETIC BIOLOGY GROUP



RESEARCHERS IN OSCAR'S REGENERATIVE MEDICAL ENGINEERING GROUP



RESEARCHERS IN OSCAR'S AI FOR HEALTHCARE GROUP

Global public health crisis spurs research excellence and accelerates technology commercialisation

Scientists from the University of Oxford's Engineering Science Department and the Oxford Suzhou Centre for Advanced Research (OSCAR) joined other academic communities in a global effort to coping with the unfolding public health crisis in 2020. The two teams, based in Oxford and Suzhou, respectively, worked together via remote collaboration to develop a rapid testing technology for the novel corona virus SARS-CoV-2 (COVID-19). The team behind the extraordinary research were recognised for their achievements as one of the 19 winners of the Royal Academy of Engineering President's Special Awards for Pandemic Service.

Sir Patrick Vallance, Chief Scientific Adviser to the Government of the United Kingdom, and HRH The Princess Royal both offered their congratulations to the award winners via recorded video messages.

"Celebrating engineering excellence has always been central to the work of the Royal Academy of Engineering and I'm delighted to add my own words of congratulations to all the talented individuals who are receiving these awards for their innovative and tireless work to address and overcome so many of the challenges society has faced during the COVID-19 pandemic... From ventilators to rapid hospital building, from modelling supply networks to developing new means of vaccine productions: what engineers do, whatever their specialism, is to understand and help solve problems. The diversity of the teams involved is noticeable and shows how bringing together people with different perspectives...increases innovation and creativity and results in better solutions. These awards show that engineers make a real difference in the world, and we need more of them to meet demand. My congratulations to all these award winners and to engineers everywhere who make such a positive contribution to society."

- HRH The Princess Royal





During the 5th UK-China Dialogue that took place in December 2020, UK Health and Social Care Secretary Matt Hancock referred to the RT-LAMP rapid test technology for Covid-19 as an excellent example of UK-China health collaboration delivering great benefits to both countries and the international community.

This technology was commercialised through OSCAR's first spinout company, Oxsed, in a phenomenal 5 months. The product is on the UK government's "List of private providers of coronavirus testing" and was already in use in major UK airports for pre-departure testing, including Heathrow, Stansted, Manchester, and Luton Airports. Importantly, the test remains reliable against the new variant of coronavirus that's been first detected in the UK in December. Individuals who are infected with the new variant can still be picked up efficently by the test.

Building on this success, in October OSCAR launched its first Innovation and Technology Centre (ITC) dedicated to Molecular Diagnostics. The Centre's aim is to increase technology readiness level and adapt pipeline research and platform technologies for specific market niches.



British Consul-General in Shanghai and Vice-Chair of SEID Administrative Committee unveils the plaque for OSCAR's first ITC





OSCAR Director Prof. Zhanfeng Cui, Principal Investigator Prof. Wei Huang and their colleagues at the testing facility at Luton Airport on Christmas Eve, joining the frontliners in their efforts to safeguard public health



OXFORD SUZHOU CENTRE FOR ADVANCED RESEARCH

OSCAR continues to increase its impact and visibility

OSCAR values its connections to partners and the public. Throughout 2020, the OSCAR team in Suzhou has helped build impact in China and beyond by representing OSCAR when no PIs were able to travel; demonstrating OSCAR's ability to adapt and thrive and weaving a robust network with academia, industry and

As local restrictions eased, OSCAR was able to host multiple events in late 2020 to showcase research and explore collaborations. These were essential for refreshing OSCAR's existing connections and forming new ones, helping to consolidate and expand OSCAR's impact as the University of Oxford's presence in China.

OSCAR Director Prof. Zhanfeng Cui addressed OSCAR's 2020 annual meeting via virtual link from Oxford Investigators, Prof. Cui expressed his sincere thanks to OSCAR's operations management team and research ensure continued growth and excellence in the New Year.



Meet OSCAR's New Researchers

Yushu Li **Research Scientist in Prof. Luet Wong's group**

Dr Yushu Li joined OSCAR on December 1st 2020 as a Research Scientist in Prof Luet Wong's Synthetic Biology group. She holds a Bachelor of Sciences degree in Pharmacy from Peking University and a PhD in Inorganic Chemistry from Luet Wong's group at the University of Oxford. Four years' experience of living and studying in UK afforded her diversified research propensities and cultivated an unrestricted mind towards exotic cultural conventions.

Dr. Li studied the biomedical pharmaceutics during her undergraduate degree, working on synthesis of biodegradable di-block copolymers which can be used to deliver targeted chemotherapeutics for accurate release at solid tumour sites. After completing her research in physical pharmaceutics, she joined Prof. Luet Wong's group at the University of Oxford studying cyclic amine functionalisation by the engineered cytochrome P450_{BM3}. The project set out to achieve remote functionalisation of monocyclic, bicyclic, fused-ring and spirocyclic amines and lactams (common motifs in construction of drug scaffolds), via simply engineering the regio- and chemo-properties of substituents, the protecting groups, and the P450_{BM3} enzymes. With the development of the project, she demonstrated that such biocatalysts were capable of rivalling with the traditional chemical catalysts in C-H activation and reaction escalation, which in turn offers medicinal chemists an alternative from green chemistry for conducting such reactions. In addition, she also discovered several novel reaction mechanisms for cytochrome P450 enzymes, which intrinsically inspires enzymologists to explore more potential industrially-scalable biosynthetic routes for natural products.

In terms of her work in OSCAR, Dr. Li will continue her pursuit on diversification of small cyclic amine molecules by P450_{BM3}. She will seek to establish reliable methodologies on computational biology, e.g., molecular dynamics simulation and docking, to sharpen the prediction tools utilised in the area. A more explorative aspect of her research will focus on de novo enzyme design and protein core-structure grafting.



Xinxin Chen Laboratory Assistant in Prof. Mauro Pasta's group

Xinxin Chen joined OSCAR at the beginning of December as a Laboratory Assistant in Prof. Mauro Pasta's Energy Storage and Conversion group. He graduated from Jiangsu University of Science and Technology with a bachelor's degree in 2016. After that, he worked as a technician at Jiangsu Union Energy company where he was responsible for the operation and equipment maintenance of the assembly section at the lithium-sulfur pouch cell pilot line.



Xinxin will assist Prof. Pasta and his colleagues at OSCAR in all aspects of their research work with the Energy Storage and Conversion group. This includes the assembly and testing of coin cell and pouch cell batteries, the use and maintenance of specialist scientific equipment, the ordering of chemical reagents and consumables, the daily management of research projects and contract maintenance. In addition, he will develop new materials, technology and processes in conjunction with Research Scientists in the group.

Meet OSCAR's IP and Technology Manager

Yechen Gui IP and Technology Manager

Yechen joined OSCAR as IP and Technology Manager at the beginning of December 2020 and has hit the ground running leading OSCAR intellectual property management activities.

After obtaining her Master's degree in biomedical engineering from Southern Medical University in 2009, Yechen worked as an researcher in the Shenzhen Institute of Advanced Technology of the Chinese Academy of Sciences for nearly three years. Her research at the time focused on parallel biomedical algorithms using Compute Unified Device Architecture (CUDA) and led to 4 papers co-published with her colleagues.

In 2012, she joined the China National Intellectual Property Administration (CNIPA). During her 8 years' career there she has held various roles developing from Patent Examiner to PCT Patent Officer and then Team Leader for patent analysis. Yechen gained substantial experience at CNIPA examining patents in China and PCT patents in their international phase. She was involved in compiling a number of protocols and guidance documents such as a "Patent Searching Manual". She is highly experienced and knowledgeable about patent laws in China and has been invited to give many talks on her insights on this topic. She was recognised as a "Bureau Level Key Talent" of CNIPA and was conferred the title of " Senior Intellectual Property Officer".

In 2017, she was seconded to the Science and Technology Bureau in Suzhou's high-tech zone where she undertook various external IP services. Her achievements during this period include reviewing a patent report on medical imaging industry analysis and working with the R&D departments of 104 enterprises located in the high-tech zone to complete their intellectual property surveys, including both licensing and patent portfolio management surveys.

From 2017 to 2020, she served an important role in two government-initiated patent analysis and navigation projects, conducting the analysis of patent data and preparing the final report and presentation with her colleagues. She published 4 papers in respected journals such as the "China Intellectual Property" and is a co-author of a book on IP which is currently close to publication.

Yechen is able to communicate effectively with researchers to understand their research and define potential IP. The broad experience of her professional career enables Yechen to identify, protect and manage potential IP and IP portfolios. She aims to work with OSCAR researchers to identify potential IP arising from their novel research, assess patentability and to explore opportunities for patent licensing and technology transfer. She will also help OSCAR develop and manage existing relationships with collaborators in a professional manner.

Outreach and Collaboration

Soochow Securities visited OSCAR

On 1st December 2020, Ms. Fang Su, General Manager of SME Financing Department of Soochow Securities Co., Ltd. visited OSCAR with a group of her colleagues. Soochow Securities is a state-owned brokerage firm controlled by the State-owned Assets Supervision and Administration Commission of the People's Government of Suzhou. Soochow Securities has a registered capital of 3.881 bn RMB, with about 40 bn RMB in total market capitalization. OSCAR's General Manager Leah He and Head of Research Cooperation Alex Yang gave the visitors a brief introduction on OSCAR's history and its research work



before leading a tour of OSCAR's laboratories. Potential cooperation opportunities were also discussed between OSCAR and Soochow Securities in a networking session that followed.

Nanjing Jiangbei New Area sends delegation to OSCAR

On 8th December 2020, OSCAR welcomed a group of visitors from Nanjing, the capital city of Jiangsu province. Among the visitors were Hongging Teng, Deputy Director of Nanjing Jiangbei New Area Central Business District Construction and Management Office; Yunyun Han, Director of Industrial Science and Technology Office of Jiangbei New Area Science and Technology Innovation Bureau; and Liangting Guo, General Manager of Cambridge University-Nanjing Centre of Technology and Innovation.



Jane Lu, Senior Regional Affairs Officer (Jiangsu) of British

Consulate General in Shanghai accompanied the visit. The is a reciprocal visit following Leah He and OSCAR's AI for Healthcare group's visit to the Nanjing Jiangbei New District and the Cambridge University-Nanjing Centre of Technology and Innovation for the first time in August of 2020.

OSCAR's General Manager Leah He and Head of Research Cooperation Alex Yang hosted the visitors. The group exchanged their experiences on the construction work, operation models and management practices of the two centres. Mr. Teng and Ms. Guo said that OSCAR offered helpful experience and demonstrated model practices for the Cambridge University-Nanjing Centre, which is due to commence operations next year. Leah expressed her hope for further such cooperation with UK research institutions to promote academic collaboration between the UK and Jiangsu province.

Establishing these links and maintaining relationships with reciprocal visits will pave the way for closer academic cooperation among first-class research institutes in Nanjing and Suzhou.

Government officials from Chongqing Liangjiang New Area visited OSCAR to promote international coopration

On 9th December 2020, Kun Zeng, Deputy Director of International Cooperation Department of Chongqing Liangjiang New Area Investment Promotion and Cooperation Bureau, and Hong-Sun Lai, Director of UK-China Business Development Centre (Southwest Region) visited OSCAR. OSCAR Head of Research Cooperation Alex Yang met with the visitors. In recent years, the Liangjiang New Area has set up a dedicated office for enhancing international cooperation. Ms. Zeng spoke about the collaboration programme between the National University of Singapore (NUS) and Chongging Liangjiang New Area established to jointly set up the NUS Chongqing Research Institute. The institute has been officially created in 2020. The team behind this collaboration programme hopes to facilitate further enhanced networking with top universities and research institutes.

SIP officials briefed on OSCAR's conception and developments

On 16th December 2020, the Deputy Director of the SIP Administrative Committee, Qian Ni, and Xie Wang, Deputy Director of Suzhou Biopharmaceutical Industry Innovation Centre visited OSCAR. OSCAR's Head of Administration, Steven Chen, and new IP & Technology Manager Yechen Gui received the visitors. Steven briefed Mr. Ni and Mr. Wang regarding OSCAR's conception and founding; its operations management, research collaboration and IP management practices. Mr. Ni expressed willingness to work with University of Oxford to advance SIP-UK cooperation in scientific research, particularly in the fields of biomedicine and bio-pharmaceuticals. He also voiced support on behalf of SIP to help OSCAR build and strengthen connections to regional academia and industry in the Yangze River Delta region.





SIP News in December

Dozens of new projects agreed to tighten innovation links between SIP and Shanghai

The Conference on SIP-Shanghai Collaboration in Science and Technology Innovation took place in Shanghai on 28th December. This meeting was designed to propel collaboration between SIP and Shanghai in driving science and technology innovation.



The event included a signing ceremony for around 30 projects to be jointly launched by partners in SIP and Shanghai in such sectors as biomedicine and artificial intelligence. A number of experts from Shanghai and Suzhou discussed strategies for coordinated development of the two cities. These occasions are also important strategic networking opportunities, and this conference saw 10 organizations establish new partnerships, including Suzhou Biomedical Research & Development Centre and Shanghai Clinical Research Centre.

The conference also played host to the inauguration of the Strategic Alliance for Cooperation in Biomedical Clinical Resources. This will establish a clinical trial collaboration mechanism to promote collaboration between seven Shanghai-based hospitals and SIP-based pharmaceutical companies in clinical testing of new drugs.

http://www.sipac.gov.cn/szgyyqenglish/News/202012/27bedd8d0c764ef1903d6a109aa4eb56.shtml

SIP to facilitate industrial adoption of digital technologies

The 2020 Summit on Empowering Innovative Trials with Digital Technology, a joint event with the 6th Glorious Jinji Lake Science and Technology Innovation Conference, took place on 25th December. A host of enterprise representatives, experts and scholars working in the AI sector across the Yangtze River Delta (YRD) region shared their expertise and discussed a series of hot issues on the development of new digital technologies.



Jointly sponsored by Jiangsu Strategic Alliance for Artificial Intelligence Technology Innovation, SIP Science & Technology Development Co Ltd. and Shanghai Artificial Intelligence Technology Association (SAITA), the annual event aims to facilitate the adoption of AI and related digital technologies to help accelerate industrial development in the region.

At the event, SIP AI Industry Association (SIPAIIA), one of the co-organizers of the event, signed an agreement with the Shanghai-based SAITA to capitalise on integrated resources in the YRD region. The strategic collaboration represents a firm commitment to promoting the development of AI industry.

The event also saw the release of *the 2020 White Paper on Al Industry in Suzhou* which captures dynamics and adoption of Al and related technologies for manufacturing purposes.

http://www.sipac.gov.cn/szgyyqenglish/News/202012/1f451ab15e5941f1986cb89d5481600f.shtml

