OSCAR

UNIVERSITY OF OXFORD

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Functional Material and Biotechnology Group at OSCAR

The functional material and biotechnology group is led by Professors Mark Moloney, Luet Wong and Jeremy Robertson. Professor Mark Moloney is focused on the development of functional materials and polymers via novel processes for possible engineering and biomedical applications. He is also interested in the synthesis of an important set of natural chemicals which exhibit antibiotic, antibacterial, antifungal and anticancer properties. Professors Wong and Robertson specialize in the modification of enzymes to precede chemical reactions that are difficult or impossible by conventional chemical methods. This biocatalysis-and-chemosynthesis-combined synthetic strategy shows significant potential for the chemistry industry for uses such as functional food additives, fine chemicals, new drugs and functional fragments.

PIs

Mark Moloney

- Professor of Chemistry, University of Oxford
- Fellow of the Royal Society of Chemistry
- Fellow and Tutor at St Peter's College, Oxford
- Member of the Editorial Board for three journals
- International expert referee for ASTAR (Singapore) and ARC (Australia)

Luet Wong

- Professor of Inorganic Chemistry, University of Oxford
- The Jennifer Green Fellow
- Fellow and Tutor at St Hugh's College, Oxford
- Founder of Oxford Biotrans Ltd.
- Winner of the 2018 Emerging Technology award of the Royal Society of Chemistry, UK

Jeremy Robertson

- Professor of Chemistry, University of Oxford
- Fellow and Tutor at Brasenose College
- Former Business Fellow with the London Technology Network
- Co-founded OxSynC for connecting external researchers with Oxford's synthetic chemists

Group members

Dandan Wang

• Research scientist

• Research interests: surface modification of various materials, development of polymerization of biscarbene systems, and the introduction of thermal responsive, wetting, adhesion or biocidal behaviors to polymer and protein surfaces. Dr. Wang received her doctoral degree from Department of Chemistry, National University of Singapore.

E-mail: Dandan.Wang@oxford-oscar.cn

M. Kamran Khan

• Research scientist

• Research interests: Material functionalization using biscarbene systems and its application for protein, polyphenols and water purification. Development of novel antifouling polymer blends using biscarbenes. Dr. Khan received his PhD from Chinese Academy of Sciences and Postdoc from Dept. of Chemical Engineering, Tsinghua University.

E-mail: kamrankhan@oxford-oscar.cn

Yang Cao

• Research scientist

• Research interests: Synthesis of complex natural compound and their derivatives via biotransformation and to develop sustainable and environmentally friendly production processes. Dr. Cao received his Doctoral Degree from Department of Chemistry, Oxford University.

E-mail: Yang.Cao@oxford-oscar.cn

Avinash Pandreka

• Research scientist

• Research interests: Metabolic engineering of microbial acetyl CoA and isoprene unit biosynthesis to increase the production of terpenoids. Engineering terpene synthases and cytochrome P450 systems to increase their efficiency and selectivity towards the terpenoid biosynthesis. Elucidating the diversity of secondary metabolites. Avinash received his PhD in biological sciences from AcSIR-Institute of Genomics and Integrative Biology, India.

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Research

Functional surface modification and polymerization laboratory

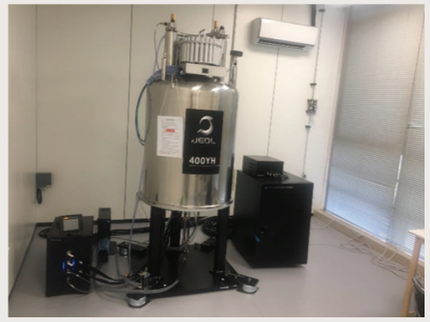
Our research will focus on the modification of material surfaces, to introduce new function and properties. We developed a wholly novel approach that permits the introduction of new properties onto polymers without changing their bulk characteristics and thus avoid cost to develop new polymer systems. Our approach uses heat or light to activate a chemical treatment, and can introduce color, fluorescent, photochromic, biocidal, adhesion and biocompatibility to the materials. We will also work on the development of polymerization methodologies using carbene reagents.

Biocatalysis, Enzyme Evolution and Synthetic Biology laboratory

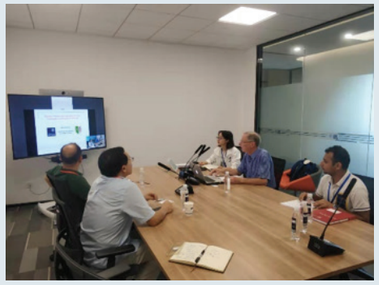
We focus to deliver new and efficient enzyme-based routes to function-diversified core structures for new molecules with biological & medical activities. Enzymes that contain iron (haem enzymes) are employed extensively in biosynthesis and in the detoxification of harmful compounds. Professors Wong and Robertson are long-standing (>25 years) academic members of the Department of Chemistry at the University of Oxford; they collaborate to apply the Wong group's library of cytochrome P450 enzyme variants to develop new, efficient pathways for the production of high-value compounds and structural diversification of key intermediates for fine chemical and drug discovery.

Analytical Characterization center

The efforts of the Analytical Center are concentrated on providing operational, informational and analytical support to the researchers. It offers an impressive range of sophisticated and specialist analytical equipment. Currently we have NMR, UV-Vis, FTIR, Contact angle, HPLC-GPC, GC, SFC-MS, Prep SFC, which gives approaches to challenging problems by producing and interpreting data from different analytical techniques. The equipment is run by dedicated, experienced staff and maintained to the highest of standards.



PI Activities



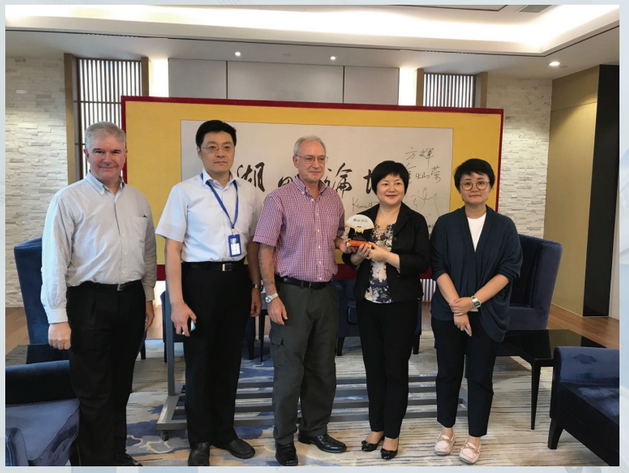
Prof. Mark Moloney held a meeting with General Manager Dr. Meijie Le and Technical Director of Suzhou Sinovent at OSCAR on 6 September. They discussed the potential collaboration in developing novel antibacterial drugs. Sinovent showed interest in Prof. Mark Moloney's research work and will have further discussions after reviewing the details.

Prof. Jeremy Robertson and Prof. Luet Wong met with Charles Ye and Dr. Xiaobing Yang of JITRI on 11 September. They discussed a potential collaboration in new drug discovery.

Prof. Zhanfeng Cui was in OSCAR in late Sept to advise research progress. Prof. Cui also met with potential collaborators, including the President of East China University of Science and Technology.

OSCAR Thinking

Prof. Kenneth Timmis, a Fellow of Royal Society and pioneer in the environmental microbiology field, was invited to give a talk in the Lakeside Forum in OSCAR as part of OSCAR Thinking. The title of the talk was 'Towards Sustainable Healthcare: DIY, Microbiomes, Interaction Meta-omics, and Microbiology Literacy'. He was invited by Prof. Wei Huang, OSCAR PI, and appointed as a Visiting Professor at OSCAR. More than 160 audience attended the talk.



Open to Collaborations

On 17 September, Dr. Xuejun Qi from Suzhou Maxwell Technology Co., Ltd. visited the OSCAR Optoelectronic Technologies Laboratory (OeTL). Dr. Qi is responsible for the company's strategy development, investment and external cooperation. He is interested in perovskite technology. Dr. Jingsong Huang met with him and discussed potential collaboration.

On 19 September, Dr. Runwen Sun, CEO of Nanchang Ningjia Electronic Technology Ltd, visited the OSCAR Optoelectronic Technologies Laboratory (OeTL). Dr. Sun and a group of three introduced their leading technology in Micro-LED which is a next generation display technology. Dr. Jingsong Huang met with them and introduced related research areas in OeTL at OSCAR and discussed possible collaborations in the future.

Dr. Viraj Perera, CEO of UniSA Ventures from University of South Australia visited OSCAR on 24 September to exchange ideas of working with Chinese partners.

On 25 September, Dr. Olivier Krischer, Deputy Director of China Studies Centre of the University of Sydney, visited OSCAR and met with General Manager Leah to discuss the possibility of collaboration on '2020 Graduate Workshop on China in the Urban Age'.

The Third Oxbridge China Forum at OSCAR

On 21 September, the third Oxbridge China Forum was held at OSCAR, themed around 'New Technology & New Economy'. The forum attracted about 100 alumni of Oxford University and Cambridge University to attend. The forum is co-organized by Oxbridge Jiangsu-Zhejiang Alumni Association, and OSCAR, and supported by Oxbridge Alumni Association of Shanghai.

Speakers at the forum included Prof. Rao Zihe, Molecular Biophysics and Structural Biology Scientist, Member of the Chinese Academy of Sciences; Prof. Zeng Jianqiu, Professor of Economics and Management, Beijing University of Posts and Telecommunications, Ph.D., University of Cambridge, and Prof. Luet Wong, Professor of Inorganic Chemistry, the University of Oxford. The topics ranged from ASFV Discovery and 5G, to ICT Development. A Panel Discussion was held in the afternoon.

OSCAR Team

In Oct 2018

In April 2019

In July 2019

In Sept 2019 (first team building event)

There are in total 21 researchers and 11 admin by Sept 2019.

Meet OSCAR Researchers

Exclusive Interview of Dr. Gert Mertes

Dr. Gert Mertes joined OSCAR in March 2019 as a Research Scientist in the Computational Health Informatics Laboratory (CHI), led by Prof. David Clifton. He joined after completing his doctoral studies in Engineering Technology at KU Leuven, Belgium where he worked on AI enabled assistive technology for elderly adults. During his doctoral research, he collaborated with researchers at Fudan University and Huashan hospital. This is a short interview with Dr. Mertes about his research projects and his life in Suzhou.

Q: What is your current main research project and how is it progressing?

The main research project I am working on right now is a collaboration with Wuhan Children's Hospital. The project's goal is to use abdominal ECG analysis of pregnant women to determine the health of the unborn foetus, by correctly identifying which parts of the signal come from the mother and from the foetus.

It is a challenging task, and signal separation presents its own difficulties in the field of AI, but it has far-reaching applications in the clinical field. Taking an abdominal ECG is a relatively simple procedure, and if we can accurately measure the foetus' heart rhythm in this way, it can be used as a pre-screening tool to detect foetal distress or abnormalities in the heart rhythm.

Ultimately, our goal is to use these methods in a portable self-screening device, where patients would have the opportunity to monitor the foetus' health at home, thus guaranteeing easier access to patients, and freeing hospital services for other emergencies. We're also working with the hospital in the area of big data to link our ECG analysis with patient records and clinical outcomes, to see if we can make predictions about the foetus' health in the future based on current recordings.

Q: How has your life been at OSCAR and what are your thoughts on the environment?

So far everything is going smoothly. The professional environment at OSCAR and funding support from local government allows me complete focus on my research. This is a contrasting experience to that of a doctoral student, where one typically must spend more time doing administrative tasks or worry about funding. The OSCAR administration staff has also been of tremendous help in helping me get settled here.

In terms of research, our lab fully came into action earlier this year, and we are working with multiple clinical partners and companies to launch joint research projects. Naturally, these agreements take some time to finalise, especially concerning the legal agreements, but once established, the available datasets and expertise these partners have to offer will result in some very exciting project outcomes. Another great perk is the infrastructure available. For instance, our computational cluster is state-of-the-art, allowing for the fast development of Deep Learning models, which are very computationally expensive. Furthermore, our offices are spacious and allow us to host students, researchers or clinicians that want to visit and work with us.

Q: What do you think of Suzhou and how have you found your living experience since starting at OSCAR?

Since I have already spent a few months living in Shanghai during my PhD studies, moving to Suzhou was relatively easy for me, as I had already experienced all the typical difficulties and challenges associated with moving to China as a foreigner. Together with the helpful support of OSCAR, this made the settling process relatively quick. As an example, I managed to find my apartment 2 days after coming to Suzhou!

Suzhou is a fantastic city to live in. The city centre is a quick subway stop away, and I live in a quiet and clean area surrounded by beautiful parks and scenery, which is something I really enjoy. Furthermore, the city is simultaneously very beautiful and full of history, and, very active with the latest technological advancements (also including the proximity to Shanghai). Combined with a very good transportation system, I am very pleased with the variety of activities available.

Q: What are your short-term and long-term plans for your career?

At the moment, mine and the lab's goal is to finish establishing our first collaborations and research projects that are currently in preparation. This will help grow the lab and invite interested parties to our technology and its potential. We are working with our partners to obtain access to clinical data from the available sources (e.g. hospitals) as our research in machine learning and AI strongly depends on access to this data.

Looking farther into the future, my goal at OSCAR is to develop my skills as a Research Scientist and to expand my knowledge in the field, as well as contribute to the enhancement of current AI tools in Healthcare. I further hope to obtain a good familiarity with the operational logistics in China, as I would like to keep my current collaborations with Chinese partners. There is much untapped potential of clinical AI yet to be explored, and China is one of the leaders in the use of such technologies. It is very exciting to be a part of that.

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Guest Professorship at SCUT

On 24 Sept 2019, Dr. Jingsong Huang, Senior Research Scientist at OSCAR, was appointed as Guest Professor at South China University of Technology from Oct 2019 to Sept 2022.

No: 5201914

Letter of Appointment

Sep 24, 2019

Jingsong Huang:

We cordially appoint you to be

Guest Professor

of South China University of Technology

Duration of Appointment:

From Oct.2019 to Sep.2022

Gao Song, President
South China University of Technology

聘请 黄劲松
为华南理工大学 客座教授
聘期自2019年10月至2022年9月

华南理工大学校长
二〇一九年九月二十四日

OSCAR New Researchers

Huidong Jia

Senior Research Scientist/Prof. Zhanfeng Cui and Prof. Cathy Ye's group

MD, MSc in biomedical science, PhD in stem cell and tissue engineering. Dr. Jia is a biomedical scientist with cross-discipline experience in clinical medicine, biomedicine and clinical transition of life technology, working on cell therapy, tissues/organs engineering and regenerative medicine.

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M. Kamran Khan

Research scientist/Prof. Mark Moloney's group

Research interests: Material functionalization using biscarbene systems and its application for protein, polyphenols and water purification. Development of novel antifouling polymer blends using biscarbenes. Dr. Khan received his PhD from Chinese Academy of Sciences and Postdoc from Dept. of Chemical Engineering, Tsinghua University.

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Yida Zeng

Technician/Prof. Zhanfeng Cui and Prof. Cathy Ye's group

Yida received his Bachelor's Degree in Biochemistry from Imperial College London in 2009. He has worked with GMP grade cell therapy for five years. Currently interested in the cell culture and characterisation. He also acts as the lab manager.

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Oxford Interns at OSCAR

OSCAR joined the Internship Office 2019 Summer Internship Programmes, which is exclusive to Oxford students. This summer, OSCAR hosted two students: one from July to August and the other from August to September.

In this September issue, we report on Henrique Rui Neves AGUIAR's 8-week internship at OSCAR.

This summer, I had the opportunity to intern at OSCAR in Suzhou, China, joining the Computational Health Informatics team for two months. Having already participated in other projects at my university, I can unquestionably say this was one of my best research experiences so far due to an incredible environment, and cutting-edge research on the application of Machine Learning to Healthcare.

I was in a research team supervised by Senior Research Scientist Dr. Yang Yang, and which also included Dr. Jun Qi and Dr. Gert Mertes as researchers. The team was incredibly friendly and accommodating. The members made sure to introduce me properly to the lab facilities and infrastructure, and they were always helpful whenever I had difficulties, whether it was on a research context or other living obstacles (mostly since I do not speak Chinese). Furthermore, I also managed to learn a lot from their research experiences and current/future projects.

My role within the team was to help study and develop a pipeline to estimate the performance of a new theoretical idea in the problem of predicting resistance of Mycobacterium tuberculosis (MTB) to currently used antibiotics. This built on previous work, by not only incorporation new embedding ideas from Nature Language Processing, but also Deep Learning tools. Neural Network models from Deep Learning are computationally very expensive, and are usually a bottleneck for most analysis. Nevertheless, the state-of-the-art cluster infrastructure present in the lab allowed us to overcome this difficulty and to develop better model optimization.

Further to the above, I was also fortunate to participate in regular meetings and attend multiple seminars and talks exploring the latest ideas for the future of Healthcare and Healthcare Research. This helped to develop my knowledge and introduce me to a wide variety of projects and subfields to explore for the future, which will undoubtedly prove useful when I start my PhD in Health Data Science, at the University of Oxford, later this year.

Throughout this internship, the assistance provided by the administrative staff proved similarly valuable in order to live in China. As a foreigner who doesn't speak Chinese, this is widely considered challenging, but I was very happy to notice this was, in fact, not true. Everything was facilitated thanks to OSCAR, who assisted me in obtaining Visas, residence permits and other legal requirements and living necessities. Moreover, OSCAR was always very happy to discuss any logistical question I had, and helped ensure I had a pleasant stay in China. The regular office lunches and snacks were also an unquestionable perk.

Overall, I am very pleased with my research internship this summer. Not only did I have the chance to conduct research on my area of interest, but I also had a strong, but completely devoid of problems, introduction to Chinese culture, and to the Chinese way of life. Without question, this internship will prove invaluable for my next steps, and I will look back on it particularly fondly.

To finalise, I would like to express my thanks to OSCAR and to the OSCAR team for giving me this opportunity. In particular, I would like to thank the administrative staff who were able to accommodate to my (many) requests, and also the CHI team, for being supportive and friendly colleagues, with a special mention to Dr. Yang for the support given during this research project.

SIP News in September

Third CAS Affiliate Settles down at Suzhou AI Industry Park

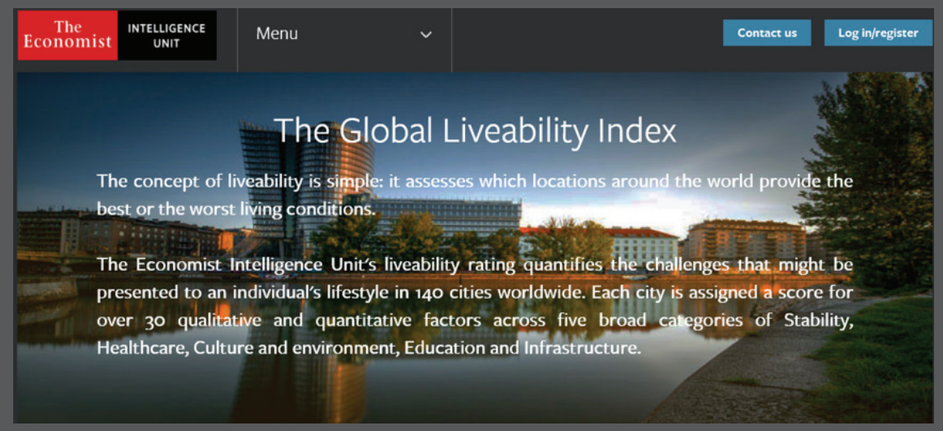
Suzhou Intelligent Computing Research Institute (SICRI), a branch of the Institute of Computing Technology at Chinese Academy of Sciences (CAS), recently settled down in Suzhou AI Industry Park, SIP, becoming the third CAS affiliate in the area following the branches of CAS's Shanghai Institute of Technical Physics and Institute of Automation.

The core team of SICRI was formed in March. In accordance with the agreement signed between SIP Administrative Committee and the Institute of Computing Technology in September 2017, SICRI is engaged in studying and developing an assortment of AI technologies such as deep learning and visual recognition for application in industrial production, medical treatment and other fields.

Suzhou AI Industry Park is an incubator and cluster of businesses engaged in AI development, and was designated one of eight of the country's 'Demonstration Parks for AI Development' in June. Relying on the rich technological and capital resources in the area, SICRI is expected to make a variety of breakthroughs in AI technologies in a short time.

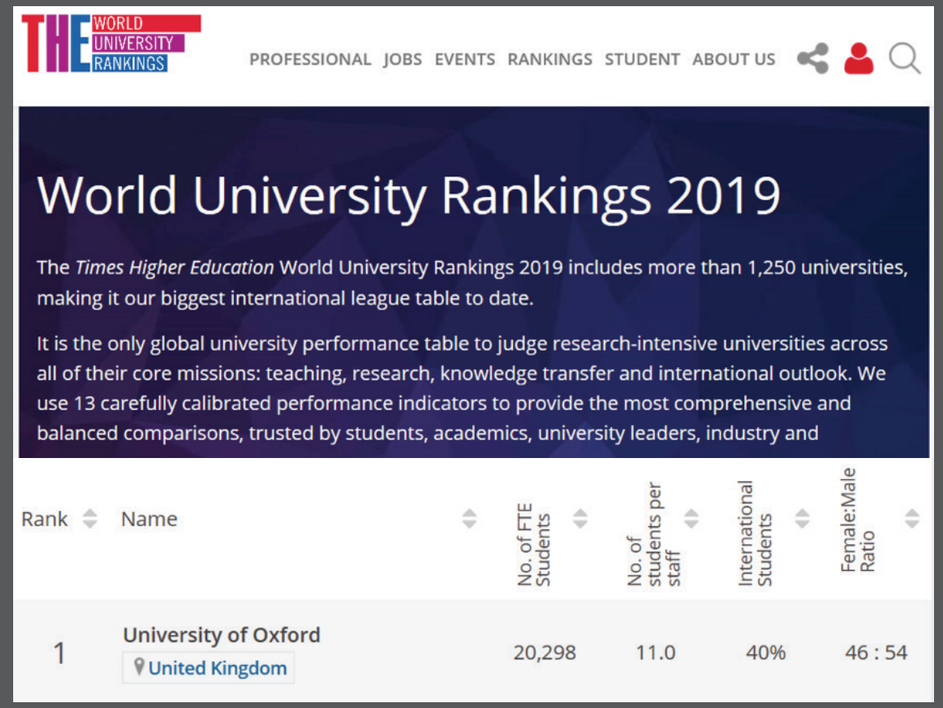
24 September 2019

http://www.sipac.gov.cn/english/news/201909/t20190925_1058668.htm



The Economist Intelligence Unit released The Global Liveability Index 2019. Suzhou ranks 75 worldwide, Beijing ranks 76, and Shanghai ranks 80. Suzhou is the most liveable city in mainland China.

http://www.eiu.com/home.aspx



The Times Higher Education Rankings has announced that Oxford is the top ranked university in the world for the fourth consecutive year.

https://www.timeshighereducation.com/world-university-rankings/2019/world-ranking#!/page/0/length/25/sort_by/rank/sort_order/asc/cols/stats