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Professor Zhanfeng Cui receives 'Suzhou International Academician Workstation' award



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Donald Pollock Professor of Chemical Engineering
Director of Strategic Projects (China), MPLS Division
Director, JITRI IMPACT Institute at the University of Oxford
Academic Founder of 4 university spin-outs

OSCAR Director and Principal Investigator, Prof. Zhanfeng Cui, has received the 'Suzhou International Academician Workstation' award by the Suzhou Municipal Science and Technology Department. He is one of only a handful of world-class scientists who have received this high-profile recognition this year. A 'Suzhou International Academician Workstation' grant is an inhouse technological innovation platform set up within a local business, research institute and university, with eminent academicians of foreign nationalities leading innovative research initiatives to deliver breakthrough technologies as well as to cultivate talent and enable international sci-tech engagement. Granted Workstations receive RMB 1m in funding for their start-up, and after one year of full operation, up to RMB 300,000 each year in performance-based research subsidies for up to 3 years.

Prof. Cui's 'Suzhou Foreign Academician Workstation' at OSCAR will commit to developing needs-driven technology and products with active involvement of industrial partners. Specifically, the foci will be two tracks of research: molecular diagnostics and *in vitro* cell amplification technologies.

Prof. Zhanfeng Cui

Molecular diagnostics platform

Building on the award-winning OxLAMP[™] technology, Prof Cui's team, working with Prof Wei Huang, will seek to develop rapid tests for a wide array of infectious diseases, such as influenza, dengue, Zika and hepatitis. Researchers will also work on developing low-cost, automated apparatus for household nucleic acid testing, allowing for in situ testing outside of the lab environment. Such nucleic acid testing apparatus will have applications in myriads scenarios, such as airports, train stations and schools where there's there is high people traffic, as well as community health centres, community hospitals and clinics which struggle to provide specialised equipment and lab.



Negative



In vitro cell amplification platform

Prof Cui will be working closely with Prof Cathy Ye. His team's area of expertise lies in the *in vitro* isolation, purification, directed differentiation and massive expansion of mesenchymal stem cells, embryonic stem cells, neural progenitor cells, skin fibroblasts and chondrocytes, as well as transgenic and nuclear transplantation techniques. The goal is to provide novel cell therapy techniques for clinical settings for the treatment of diseases such as spinal cord injury, stroke, amyotrophic lateral sclerosis, Alzheimer's disease, osteoarthritis, osteonecrosis of the femoral head and intervertebral disc degeneration.

Professor Luet Wong receives 'Suzhou Foreign Expert Workshop' awaro



OSCAR's Biocatalysis, Enzyme Evolution and Synthetic Biology laboratory led by Prof. Luet Wong has received the "Foreign Expert Workshop" award. Similar to a 'Suzhou International Academician Workstation', a 'Suzhou Foreign Expert Workshop' will function as an inhouse technological innovation platform and serve to attract eminent academics to undertake research in Suzhou. Prof. Luet Wong is the second OSCAR PI to have received this recognition after OSCAR Deputy Director, Prof. Mark Moloney, whose Surface Materials Chemistry lab at OSCAR was awarded such a grant in June 2020.

Funding for established workstations is contingent upon research progress made during the first year. Workshops receive financial subsidies capped at 300,000 RMB per year, with the possibility for each workshop to apply up to three times.

Prof. Luet Wong

 Professor of Chemistry, University of Oxford Jennifer Green Fellow and Tutor in Chemistry, St Hugh's College Founded Oxford Biotrans Ltd. • Emerging Technology Award of the Royal Society of Chemistry, UK (2018)



Biosynthesis of natural products and chemical diversification by P450 catalysed C-H bond oxidation. The starting material could be glucose which is converted by assembled biosynthetic pathways into natural products or a core structure is functionalised by P450 enzymes at multiple positions and the metabolites serve as intermediates for diversification.

Prof. Luet Wong specialises in the modification of enzymes to catalyse chemical reactions that are difficult or impossible by conventional chemical methods. At OSCAR, he directs research work in a) construction and directed evolution of synthetic biology systems to produce naturally occurring fine chemicals, nutraceuticals and pharmaceuticals, and b) engineering cytochrome P450 enzymes into versatile catalysts for oxidising chemically inert carbon-hydrogen bonds in a wide range of organic compounds. The P450 technology provides direct routes to introduce chemical diversity to any core structure. The synthetic biology platform provides alternative, sustainable sources of natural products that occur at low concentrations or are from endangered species. Oxidative diversification of natural products and chemical compounds provides a pool of novel compounds for drug screening.

Recent OSCAR Publications

OSCAR Institute for Mathematical Modelling and Data Analytics



Prof. Zhongmin Qian joined OSCAR last April as one of four PIs leading the new Mathematical Modelling and Data Analytics section. Prof. Qian's research focuses on stochastic analysis: diffusion processes, rough path analysis and machine learning, statistical mechanics, backward stochastic differential equations and stochastic (partial) differential equations. It has application in financial innovations - such as active portfolio management, exchange rates and high-frequency data analysis and also areas of mathematical physics including condensed matter physics, quantum fields and high energy physics.

Prof. Qian is the lead author of a new paper examining a class of McKean-Vlasov stochastic differential equations (SDEs) which arise from random vortex dynamics. The authors presented a new approach to resolve the existence and uniqueness of both the weak and strong solutions for the McKean-Vlasov SDEs whose coefficients are defined in terms of singular integral kernels.

This paper is available to read online as a pre-print:

Qian. Z. and Yao, Y. (2021). McKean-Vlasov type stochastic differential equations arising from the random vortex method. arXiv preprint arXiv: 2104.05100 (2021).

OSCAR Physical, Biomedical & Industrial Acoustics Lab and Biotechnology group

Researchers at Oxford and OSCAR have described the genetic engineering of established biofilms in their habitat in a new paper. OSCAR PIs Professors Ronald Roy, Jason Raymond, Ian Thompson and Wei Huang led this collaborative research work in which researchers applied an ultrasound-mediated DNA delivery (UDD) technique to introduce plasmid to established non-competent biofilms in situ, reporting for the first time a potentially scalable direct genetic engineering method for established non-competent biofilms, which can be exploited in enhancing their capability towards environmental, industrial and medical applications.



Dr. Chun Kiat Ng

Dr Chun Kiat Ng is the first author of this paper. He is a Senior Research Scientist in OSCAR's Environment and Biotechnology group led by Prof. Ian Thompson. He is also a Postdoctoral Research Fellow at Department of Engineering Science, University of Oxford.



Prof. Ronald Roy

Prof. Ronald Roy is the lead PI of OSCAR's Physical, Biomedical, and Industrial Acoustics research group and Professor of Mechanical Engineering. He is currently Head of the Department of Engineering Science at the University of Oxford.



Dr. Jason Raymond

Dr Jason Raymond jointly leads Physical, Biomedical, and Industrial Acoustics research group. He is the Head of the Industrial and Biomedical Acoustics laboratory at OSCAR and a Departmental Lecturer at the University of Oxford.



Prof. lan Thompson

Prof. Ian Thompson leads the Environment and Biotechnology group at OSCAR. He is a Professor of Engineering Science, University of Oxford.



Prof. Wei Huang of Oxford.

Usually, scientists need to extract the bacteria cells in biofilms from the environment, grow them as lab culture before conducting genetic modification (e.g., inserting foreign plasmid) on the bacteria, then try to grow the modified bacteria back into the environment. This study is the first in the world to demonstrate that plasmids can be inserted directly into the bacterial cells in biofilms at their native environment, without the need of extraction and purification steps, using ultrasound techniques. Since this ultrasound technique is a physical effect, it can be used for all types of bacteria (gram-positive, gram-negative, anaerobic, nonculturable etc). Additionally, ultrasound is scalable and precise, enabling industrial-scale wastewater treatment or even clinical applications (such as visualising or improving gut microbiome).

This paper is available to read online and in print: Chun Kiat Ng, Samuel L. Putra, Joseph Kennerley, Robert Habgood, Ronald A. Roy, Jason L. Raymond, Ian P. Thompson, Wei E. Huang. (2021). Genetic engineering biofilms in situ using ultrasound-mediated DNA delivery. *Microbial biotechnology*. https://doi.org/10.1111/1751-7915.13823



Prof. Wei Huang is the PI leading the Synthetic Biology and Single Cell Biotechnology group at OSCAR. He is an Associate Professor of Engineering Science, University



OSCAR Functional Materials Research group



Dr. Muhammad Kamran Khan,

OSCAR Research Scientist in Prof. Mark Moloney' s research group led a project on digital healthcare for course work during a programme on digital economy and health care at Tsinghua University. The research work was presented by Dr Khan at the Yanjiu International Conference held in Shenyang, Liaoning province, China. The project was a collaboration among research scientists

from OSCAR, Tsinghua University, Beijing Institute of Technology, Southwest University of Sci & Tech, United Methodist University, North China Electric Power University, Changsha University of Sci & Tech, SINANO Chinese Academy of Sciences, Central South University and Renmin University of China.



 VANJU CONFERENCE

 International Conference on

 Medicine, Nursing and Healthcare

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 With the Mark G. Moloney has presented a paper

 entitled "The Global Picture of Future Healthcare: Challenges

 and Solutions (Covid-19 Case Study)" at the International

 Conference on Medicine, Nursing and Healthcare (ICMNH)

held in Shenyang, China on 21st-22nd April, 2021.

Paper ID: YC-ICMNHSHEN-210421-100



This research work focuses on the digitalisation of healthcare. Exemplified by the digital healthcare system of China, digitalisation is an essential tool in controlling pandemics like COVID -19. The current healthcare infrastructure is beset with a many challenges that became evident during the COVID-19 pandemic, including data centralisation leading to information silos, non-resiliency and huge cost to health institutions and patients alike. Other challenges include system interoperability, rigid and limited payment modules, opaque processes, cyber-attacks, downtimes, delays, resource allocation, fatigue culminating into human error, financial misappropriations, and fraud, as well as counterfeit drugs, among others. Digital technologies like blockchain, cryptocurrency and distributed storage technology hold much promise in resolving the challenges associated with the current healthcare system by providing decentralized identification for patients, patient-centric data ownership and control mechanisms, secured global access to Electronic Health Records (EHR) to facilitate data sharing among health facilities, decentralized medical research data repository to foster knowledge sharing among healthcare professionals, efficient and flexible payment modalities, automated processes using smart contracts, as well as robust, transparent, immutable and auditable chain of events potentially averting fraud and counterfeiting among others. During the COVID-19 pandemic, countries like China have utilized the predictive power of ITC (big data) to keep the global spread of the pandemic in check. This is just one of many examples of how technology can be wielded under the banner of e-Health to help care and save millions of people around the world.

The paper is available to read online and in print:

M. Kamran Khan, M. Nauman Khan Khalil, Justice Odoom, Christello E. Mulbah, Gbehibognehand Igor Felix, Kanamugireemmanuel, Muhammad Tariq, Samuel Fornah, Abd Alwahed Dagestani, Tinashe Mandaza, Mark G. Moloney. (2021). The Global Picture of Future Healthcare: Challenges and Solutions (Covid-19 Case Study). YANJIU INTERNATIONAL CONFERENCE. Shenyang, 21 April 2021. China. Institute for Technology and Research: 54-58 https://worldresearchlibrary.org/proceeding.php?pid=4239





11,,, OSCAR Impact and Collaboration

OSCAR Research Scientist gains insights into digital innovation through programme offered by Tsinghua

Dr. Muhammad Kamran Khan in Prof. Mark Moloney's group has recently completed the "Innovation and Entrepreneurship for Digital Economy Programme" offered by Tsinghua University.



This is an online multidisciplinary programme that provides expert reviews and guidance from world leaders on advances in digital technology, digital economy, and innovative education. With the aims to "drive digital economy innovation for a better world", the programme is directed by Professor Kris Singh who is a Visiting Professor at Tsinghua University. He is the founder and CEO of the Silicon Valley-based Service Research & Innovation Institute (SRII).

The month-long course comprises 25 lectures delivered by industry leaders, government officials, university chancellors and entrepreneurs from all over the world. Among the prominent speakers were Kevin Hall (President and Vice Chancellor, University of Victoria), Jeetu Patel (Senior Vice President, CISCO), Janet Nelson (Deputy Vice Chancellor, University of New Castel), Francisco Betti (World Economic Forum), Justin Mclean (IoT, Apache Software Foundation Australia), Jay Lee (Vice Chairman, Foxconn), V. Ramgopal Rao (Director, Indian Institute of Technology), Bratin Saha (Vice President, Machine Learning Amazon), and Enno De Boer (Global Head, McKinsey & Com).

In parallel to the programme, Dr. Khan has also led a team of 10 members on a course project that looks at digital healthcare solutions for future pandemics. The project argues for the digitalization of healthcare with a case study of China's healthcare digitalization practices and their successful implementation during COVID-19 pandemic. The research work was reported in the paper "the Global Picture of Future Healthcare: Challenges and Solutions (Covid-19 case study)" and subsequently presented at the Yanjiu Conference.

OeTL to collaborate with Researchers from FJIRSM in organic laser

On 18 May, researchers from Fujian Institute of Research on the Structure of Matter (FJIRSM), Chinese Academy of Sciences visited the Optoelectronic Technology Laboratory (OeTL) at OSCAR. On behalf of Prof. Hui Su and Prof. Guangling Bian from FJIRSM, Dr. Qi Lin and Dr. Xiaofan Zhang introduced what has been achieved by their team in terms of research and industrial cooperation, with a particular emphasis on the latest developments of novel organic laser gain media.



OeTL and FJIRSM agreed to further cooperate in the design, synthesis and characterization of a series of organic laser gain materials, and the realization of electrically pumped organic laser diodes.

OSCAR receives delegates of 2021 APEC Seminar on Policy for Science, Technology and Innovation, and Project Cooperation

Delegates of 2021 APEC Seminar on Policy for Science, Technology and Innovation, and Project Cooperation visited OSCAR on 21 May on the sidelines of the meeting. The



Dr. Jingsong Huang, Co-Pl of OeTL presented the lab's research fields and gave the visitors a lab tour. He was followed by Senior Research Scientist Dr. Jie Lin and Research Technician Geng He, who gave an account of the Amplified Spontaneous Emission (ASE) property of samples they have developed which show great potential in organic laser application.



delegation consisted of seminar participants who represent multiple government

agencies, think tanks, institutes of higher-learning and research, and technology transfer agencies, who shared their insights into topics on Asia-Pacific regional cooperation, pathways for technology transfer in the Asia-Pacific region, and collaboration across science, technology and innovation in a post-pandemic era. OSCAR General Manager Leah He and Head of Research Cooperation Alex Yang met with the delegation.

Director-General of the China Centre of the Russian Academy of Engineering visits OSCAR



Zhifeng Ding, Director-General of the China Centre of the Russian Academy of Engineering and his colleagues visited OSCAR on 27 May. OSCAR General Manager Leah He met with the visitors, leading them on a tour of OSCAR laboratories. The group was accompanied by senior officials from the Suzhou Science and Technology Department and Suzhou Administration for Foreign

Specialist Affairs.

OSCAR meet with members of Federation of Jiangsu Returned Overseas Chinese

Members of the Federation of Jiangsu Returned Overseas Chinese, led by their Vice-Chair, paid OSCAR a visit on 27 May. OSCAR was one of the stops of the visitors' study trip in south Jiangsu Province, to better understand the region's good practice in innovation and entrepreneurship. OSCAR General Manager Leah He received the group.



SIP News in May

3rd BIO50 Summit held in SIP

The third BIO50 Summit was held in SIP on 15 May where 50 big names in biotech and related sectors discussed developments in the vaccine industry in China from the perspectives of policy-making, technology innovation and financing.

The BIO50 Summit is China's first high-level, biotech-focused closed-door meeting initiated by Hollyhigh, a Chinese company that specilises in healthcare sector investment. This year's event was jointly sponsored by Hollyhigh andMorning Whistle Group, a Chinese cross-border mergers and acquisitions service platform.



At the event, SIP Investment Promotion Committee signed a framework agreement with the two companies to establish a long-term mechanism for exchanges and cooperation for medical and health projects.

The Summit also feature keynote speeches revolving around the research and development of vaccines, as well as a roundtable and panel discussions on topics concerning the development of the vaccine industry in China. The White Paper on Chinese Vaccines was released at the event.

3rd BIO50 Summit held in SIP. SIP News. Sourced on 15 May, 2021, from SIP's website. http://www.sipac.gov.cn/szgyyqenglish/News/202105/f907be887dc4484f8625bcc ebed52d47.shtml

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