THE UNIVERSITY OF SYDNEY

ARC Training Centre for
Innovative BioEngineering

The 3rd Personal Journeys to Translation Symposium

When
2 December 2021
8:45 am – 12:00 pm
AEDT

Zoom ID
81334057683

Every ground-breaking medical discovery faces the difficult hurdle of translation - being taken out of the lab and being developed into a product to be used in real-life.

In this online seminar, hosted by the ARC Training Centre for Innovative BioEngineering, we will hear from pioneers in biomedical engineering about their own personal journeys on the road to translation, taking their research out of the lab and into the clinic. This opportunity to learn from and be linked with mentors who are among the brightest minds in the international bioengineering landscape is not to be missed.

Register

The ARC Training Centre for Innovative BioEngineering provides the next generation of researchers with interdisciplinary skills and mentorship to be leaders in the rapidly evolving, highly innovative field of bioengineering. This event is a significant step in this journey.

https://www.eventbrite.com.au/e/169802827829

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Program

The 3rd Personal Journeys to Translation Symposium

Thursday 2 December 2021, 8:45am - 12:00pm (AEDT)

8:45 - 9:00 am	**Opening Addresses** **Professor Fiona Wood / Prof. Hala Zreiqat**
9:00 - 10:20 am	**Session 1: US Speakers Session** **(Chairs: Prof Hala Zreiqat, Prof Fiona Wood)**
9:00 am	**Advances in drug delivery** **Prof. Robert Langer, Massachusetts Institute of Technology**
9:20 am	**BMP2: from discovery to patient** **Prof. Vicki Rosen, Harvard University**
9:40 am	**Pursuing translational biomedical science in an academic lab** **Prof. Gordana Vunjak-Novakovic, Columbia University**
10:00 - 11:00 am	**Session 2: Australian Speakers Session** **(Chairs: Dr. Jiao Jiao Li, Dr. Ashnil Kumar)**
10:00 am	**Advanced biomaterials for tissue engineering** **Prof. David Nisbet, University of Melbourne**
10:20 am	**Translational application of microfluidic cell sorters** **Prof. Majid E. Warkiani, University of Technology Sydney**
10:40 am	**Immunotherapy for autoimmune disease** **Prof. Ranjeny Thomas, University of Queensland**
11:00 - 11:45 am	**Panel Discussion** -- Prof. Hala Zreiqat, Prof. Fiona Wood, Prof. David Nisbet, Prof. Majid Warkiani, Prof. Ranjeny Thomas -- Moderators: Dr. Jiao Jiao Li, Dr. Ashnil Kumar
11:45 - 12:00 am	**Close**

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Advances in drug delivery

Abstract: Advanced drug delivery systems are having an enormous impact on human health. Prof. Langer will briefly discuss their early research on developing the controlled release systems for macromolecules and how that led to the isolation of the first angiogenesis inhibitors and then led to numerous new therapies, including nanoparticle-based drug delivery.

Prof. Robert Langer is one of 12 Institute Professors at the Massachusetts Institute of Technology (MIT); being an Institute Professor is the highest honor that can be awarded to a faculty member. He has written over 1,500 articles, which have been cited over 352,000 times; his h-index of 293 is the highest of any engineer in history and tied for the 4th highest of any individual in any field. His patents have licensed or sublicensed to over 400 companies; he is a cofounder of a number of companies including Moderna. Dr Langer served as Chairman of the FDA's Science Board (its highest advisory board) from 1999-2002. His over 220 awards include both the United States National Medal of Science and the United States National Medal of Technology and Innovation (he is one of 3 living individuals to have received both these honors), the Charles Stark Draper Prize (often called the Engineering Nobel Prize), Queen Elizabeth Prize for Engineering, Albany Medical Center Prize, Breakthrough Prize in Life Sciences, Kyoto Prize, Wolf Prize for Chemistry, Millennium Technology Prize, Priestley Medal (highest award of the American Chemical Society), Gairdner Prize, and the Dreyfus Prize in Chemical Sciences. He holds 36 honorary doctorates and has been elected to the National Academy of Medicine, the National Academy of Engineering, the National Academy of Sciences and the National Academy of Inventors.

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BMP2 - from discovery to patient

Abstract: Prof. Rosen will describe her involvement in the identification of BMP2 as a bone regeneration protein and the subsequent hurdles faced in developing BMP2 bone regeneration products.

Prof. Vicki Rosen is currently Professor and Chair, Department of Developmental Biology at Harvard School of Dental Medicine and a Principal Member of the Harvard Stem Cell Institute. She began her career at Genetics Institute, a biotechnology company, where she was part of the team that isolated the first BMPs genes and successfully launched recombinant human BMP2 as a therapeutic for enhancing bone repair. Dr. Rosen has been honored with numerous awards, including the Kappa Delta Ann Donner Vaughn Award for outstanding orthopedic research, the Marshall Urist Award for excellence in tissue engineering research, the Raine Medical Research Foundation Medal, and the William F. Neuman Award, the most prestigious award given by The American Society for Bone and Mineral Research (ASBMR). Her laboratory at HSDM studies BMP family molecule signaling in musculoskeletal tissues with the goal of using knowledge gained to enhance tissue repair and regeneration.

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Pursuing translational biomedical science in an academic lab

Abstract: Prof. Vunjak-Novakovic will reflect on doing translational research in her academic lab that is devoted to engineering functional human tissues for use in regenerative medicine and patient-specific “organs-on-a-chip” for studies of human physiology in health and disease. She will briefly review her team’s research, and speak about life and work in academia, lessons learned, and some helpful strategies.

Prof. Gordana Vunjak-Novakovic is University Professor, the highest academic rank at Columbia University and the first engineer at Columbia to receive this distinction. The focus of her lab is on engineering functional human tissues for use in regenerative medicine and patient-specific “organs-on-a-chip” for studies of human physiology in health and disease. She is well published and highly cited, has mentored over 150 trainees, and launched four biotech companies form her lab. She is serving on the Council of the NIBIB, the HHMI Scientific Review Board, and on numerous editorial and scientific advisory boards. She was inducted into the Women in Technology International Hall of Fame, received the Clemson Award of the Biomaterials Society, Pritzker Award of the Biomedical Engineering Society, Shu Chien Award of the AIChE, Pierre Galletti award of the AIMBE, and was elected Fellow of several professional societies. She was decorated by the Order of Karadjordje Star - Serbia’s highest honor, and elected to the Academia Europaea, Serbian Academy of Arts and Sciences, the National Academy of Engineering, National Academy of Medicine, National Academy of Inventors, the American Academy of Arts and Sciences and the International Academy for Medical and Biological Engineering.

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Advanced biomaterials for tissue engineering

Abstract: Prof. Nisbet will discuss his journey leading to the start of his first company NanoStratus. The team is focused on a variety of sectors, but are specifically targeting coatings that can resist pathogen contamination and transmission. He will discuss sprayable coatings that have an intrinsic ability to resist the uptake of bacteria and viruses from surfaces and droplets, such as those generated by sneezing or coughing. He will also discuss challenges with taking this technology to market and future plans.

Prof. David Nisbet: The Nisbet Lab is focused on developing advanced biomaterials. At the core of our activities is the development of materials that are used to both mimic the natural extracellular environment and to provide a platform for the targeted delivery of therapeutic molecules for regenerative medicine and tissue engineering.

Prof. Nisbet is passionate about developing biomaterials, and in particular about seeing the biomaterials developed translated into the clinic. His research group consists of a team of engineers, chemists, and biologists, all working together to create novel materials to help combat disease and injury.

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Translational application of microfluidic cell sorters

Abstract: Micro/nano-fluidics, the engineered manipulation of fluids at the micro/nano-scale, has shown considerable promise in point-of-care diagnostics and clinical research. Over the past 10 years, Prof. Warkiani's group has developed several microfluidic systems, which are translated into practice. He will describe recent efforts in development of new Microfluidic systems using 3D printing and microfabrication for various biological research applications. He will showcase novel systems for high-throughput rare cell sorting (e.g., circulating tumour cells (CTCs), circulating fetal cells, and circulating stem cells) and their clinical utilities. He will present some of the team's efforts for large-scale manufacturing and enrichment of hybridoma cells inside perfusion bioreactors for drug development and therapeutic applications.

Prof. Majid E. Warkiani is Professor in the School of Biomedical Engineering, UTS, Sydney, Australia. He received his PhD in Mechanical Engineering from Nanyang Technological University (NTU, Singapore), and undertook postdoctoral training at Massachusetts Institute of Technology (MIT, USA). Dr Warkiani is co-director of the Australia-China Joint Research Centre for Point of Care Testing and a core-member of Institute for Biomedical Materials & Devices (IBMD) and Center for Health Technologies (CHT) at UTS. Dr Warkiani's current research focuses on three key areas of (i) Microfluidics involving the design and development of novel microfluidic systems for particle and cell sorting (e.g., circulating tumor cells, fetal cells & stem cells) for diagnostic and therapeutic applications, (ii) Organ-on-a-chip involving the fabrication and characterisation of novel 3D lab-on-a-chip systems (e.g., Lung-on-a-chip, Tumour-on-a-chip) to model physiological functions of tissues and organs, and (iii) 3D Printing involving the design and development of novel miniaturised systems (e.g., micromixers, micro-cyclones) for basic and applied research.

Group webpage: www.WarkianiLab.com

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Immunotherapy for autoimmune disease

Abstract: Prof. Thomas will talk about her personal journey in the translation of antigen-specific tolerising immunotherapy for prevention and cure of autoimmune disease.

Prof. Ranjeny Thomas is Professor of Rheumatology at University of Queensland, Translational Research Institute, consultant Rheumatologist at Princess Alexandra Hospital, fellow of the Australian Academy of Health and Medical Sciences and member of the Order of Australia. She founded the Uniquest spin-off company Dendright. Her research seeks to understand autoimmune disease and restoration of immune tolerance. She developed and tested antigen-specific immunotherapy for Rheumatoid Arthritis, based on dendritic cell and liposome formats in two world first proof-of-concept trials. Her team is partnered with CSL in Sjogren's syndrome immunotherapy, and she is progressing an antigen-specific immunotherapy for type 1 diabetes to clinical trials. She has contributed major insights into the role of the microbiome in spondyloarthropathy.

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Panel Chair

Professor Fiona Wood

Prof. Fiona Wood is one of Australia's most innovative and respected surgeons and researchers. A highly skilled plastic and reconstructive surgeon and world leading burns specialist, she has pioneered research and technology development in burns medicine.

One of Prof Wood's early achievements was the development of a skin culture lab that she co-founded with scientist Marie Stoner. Together they recognised the potential of tissue engineering technology to treat burns (called cultural epithelial autograph or CEA) and in 1993 developed a skin culture facility with support from a Telethon grant. Their product evolved from confluent sheets of CEA to aerosol-delivered cell-clusters, and is known as 'spray-on skin'. This technology, commercialised through Clinical Cell Culture Pty Ltd (now AvitaMedical) is a world-first and has been used on more than 1000 patients around the world. In 2005 Fiona and Marie won the Clunies Ross Award (Australian Academy of Technological Sciences and Engineering) for their contribution to medical science in Australia.

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Panel Chair

Professor Hala Zreiqat AM

Prof. Hala Zreiqat AM, is Professor of biomedical engineering, and Director of the ARC Training Centre for Innovative BioEngineering, University of Sydney. She is a trailblazer in the field of biomaterials and tissue engineering; a national leader in advancing collaborative research ventures between academics, clinicians, and industry in the field of musculoskeletal and biomaterials research, which has led to several awarded patents and more than $18M in competitive funding. Her contribution to biomaterials and orthopaedic research has led to a number of awards, including being named a Member of the Order of Australia, the 2018 New South Wales Premier's Woman of the Year, the King Abdullah II Order of Distinction, and the Eureka Prize winner for Innovative Use of Technology. She is a 2021-2022 Fulbright Senior Scholar; a Radcliffe Fellow at Harvard University (2016-2017); a Fellow of the Australian Academy of Sciences; Australian Academy of Health and Medical Sciences; Australian Academy of Technology & Engineering; the International Orthopaedic Research Society; and the Royal Society of New South Wales, making her a fellow of all distinguished learning academies in Australia.

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Panel Moderators

Dr. Ashnil Kumar

Dr. Ashnil Kumar is an Assistant Deputy Director of the ARC Training Centre for Innovative BioEngineering and a Lecturer in biomedical engineering at the University of Sydney. His research into computing algorithms and their application within clinical workflows is focused on the design and development of decision support systems that enhance clinicians' decision-making capacity. He works closely with clinicians from hospitals across Sydney to build and translate computing technologies relevant to clinical needs.

Dr. Jiao Jiao Li

Dr. Jiao Jiao Li is a biomedical engineer, Lecturer and NHMRC Early Career Fellow at UTS, a Co-Deputy Director and chief investigator on the ARC Training Centre for Innovative BioEngineering, a Science & Technology Australia 2021-22 Superstar of STEM, and the winner of Falling Walls Lab Australia 2021. She is researching regenerative approaches to treat chronic musculoskeletal conditions such as osteoarthritis and bone loss. She has particular interest in developing stem cell-based therapeutics, as well as biomaterials for tissue engineering.