

Victoria and North Asia Research and Innovation Forum



Study Melbourne is pleased to host the Victoria and North Asia Research and Innovation Forum on 19 May 2022.

The purpose of this forum is to facilitate collaboration on future potential partnerships and expansion of research links between Victoria, South Korea and Japan. The forum will also promote existing collaborative research partnerships between universities, research institutions and the broader research community in the field of renewable energy.

Representatives from universities, research institutes and independent researchers are encouraged to attend this forum .

Unprecedented opportunities in Victoria's renewable energy sector

Victoria is recognised as a global knowledge hub, attracting the best researchers and investments from around the world. It is home to world-class research institutions and facilities which underpin excellence in research.

Victoria is leading Australia's renewable energy initiatives. This is demonstrated by the number of world-class renewable energy research hubs in Victoria, including the University of Melbourne's Energy Institute, Deakin University's Institute for Frontier Materials, Swinburne University of Technology's Victorian Hydrogen Hub and the Monash Energy Institute.

The Victorian Government is committed to building Victoria's renewable energy capabilities and credentials and, in 2020, announced an unprecedented AUD\$1.6 billion energy package designed to create renewable energy hubs across the state, improve crucial grid infrastructure, decarbonise our energy system, drive down emissions and support more solar homes. The package includes AUD\$540 million to establish six Renewable Energy Zones, unlocking new renewable energy investment that will support economic growth and jobs, and ensure Victoria meets its 50 per cent renewable energy target by 2030.



Welcome and Opening Remarks, Dr. Amanda Caples, Victoria's Lead Scientist

Dr. Amanda Caples BSc Hons PhD GAICD was appointed as Victoria's Lead Scientist in mid-2016. Dr. Caples aligns and connects Victoria's science, technology and innovation capability with business needs and with government's economic development activities (including investment, trade and future workforce strategies).

Dr. Caples has led the development of industry, science and innovation policy in Victoria since joining the Victorian Public Service in 2002 as the inaugural Director of Biotechnology. During this time she has delivered major policy reforms, a range of programs and global partnerships, and landmark initiatives including the Victorian Comprehensive Cancer Centre.

Session 1

Renewable Energy R&D and Innovation Partnerships

This session showcases Victoria's renewable energy partnerships with Japan and South Korea, and provides information about how future joint research partnerships can be established.

New technology to convert seawater to Hydrogen 100% driven by solar energy

Prof. Baohua Jia, Swinburne University of Technology

Prof. Joong Hee Lee, Jeonbuk National University (JBNU), Korea

Project Summary

This project will support the development of a game-changing prototype of a highly efficient product using solar heat which directly produces hydrogen from the sea.

This 'All-in-One' solar-powered seawater-to-hydrogen generator could produce 10,000 litres of hydrogen from a 100-square-metre prototype per day, potentially driving a heavy truck for 100km.

Bringing Victoria's and Korea's world-leading hydrogen expertise together has the potential to reduce the price of hydrogen and give Victoria early access to the \$11 billion hydrogen economy, creating up to 7,600 jobs by 2050.



Prof. Baohua Jia

Professor Baohua Jia is the founding director of Centre for Translational Atomaterials at Swinburne University of Technology and a Future Fellow funded by the Australian Research Council. Dr Jia's research focuses on the fundamental light and nano- and atomaterial interaction. Dr. Jia has co-authored more than 260 scientific publications in highly ranked journals and prestigious international conferences. She has received numerous prizes and awards, including but not limited to the ARC Future Fellow, DECRA and APD.



Prof. Joong Hee Lee

Professor Joong Hee Lee is a world-renowned authority on hydrogen generation and storage. He is a Fellow of the Korean Academy of Science and Technology and the National Academy of Engineering of Korea. He has over 25 years of research experience on catalyst development and polymer nanocomposites for electrical/electronic applications. He is the Head of the Department of BIN Convergence Technology and the Director of Advanced Materials Institute of BIN Convergence Technology at Jeonbuk National University (JBNU). He has received numerous awards, including the Best Scientist and Engineer of the Month from the Korean Government, and the best research professor at JBNU for consecutive three years.

New directions for the harvesting and manipulation of thermal energy

Dr. James Hutchison, the University of Melbourne
Assoc. Prof. Kenji Hirai, Hokkaido University, Japan
Prof. Hiroshi Uji-i, Hokkaido University, Japan

Project Summary

Approximately 90 per cent of the world's energy use involves the generation or manipulation of heat for things like cooling and heating of buildings, and growing food. Future energy economies must better exploit this resource that is often considered a waste product, for example by developing devices which up-convert low energy thermal radiation to a more readily usable form.

The aim of this project is twofold; firstly, to develop methods to produce ultra thin, thermal harvesting materials using chemical vapour deposition. Secondly, to interface these materials with photonic nanostructures and demonstrate control of thermal relaxation pathways. The final goal is proof-of-principle thermal harvesting which may inspire future device development.



Dr. James Hutchison

James Hutchison is an Australian Research Council Future Fellow at the School of Chemistry, the University of Melbourne, working on optical sensing and 2D materials. Previously he was Chargé de Recherche with the CNRS in Strasbourg, France, working on plasmonics and light-molecule strong coupling. He studied single-molecule imaging as a post-doctoral student at KU Leuven, Belgium. He received his PhD from the University of Melbourne (2006) with a research focus on photosynthetic mimicry.



Assoc. Prof. Kenji Hirai

Kenji Hirai received his PhD from Kyoto University in 2013. He was a postdoctoral research fellow at the University of Michigan. In 2014, he became an Assistant Professor at Hokkaido University. Since 2018, he has been a researcher in the PRESTO program of the Japanese Science and Technology Agency. His current research interests are nanomaterials and light-matter interaction.



Prof. Hiroshi Uji-i

Hiroshi Uji-i received his PhD from the Department of Chemistry, Tohoku University in 2002. He was a postdoctoral research fellow at Katholieke Universiteit Leuven, Belgium. He is currently a Professor at Katholieke Universiteit Leuven, and Hokkaido University, Japan. His current interests are high-resolution microscopy and plasmonic.

Developing the proton battery and proton flow reactor systems for energy storage

Prof. John Andrews, RMIT University

Prof. Hiroshige Matsumoto Kyushu University, Japan

Project Summary

This project will support the proton battery and proton flow reactor towards commercialisation. These technologies are novel means of storing atomic hydrogen in porous carbon materials and may assist in guaranteeing reliable electrical power from intermittent renewable energy sources. They potentially have major economic benefits and greenhouse emission reduction potential.

An optimised proton battery system for small-scale applications, such as household solar, will be constructed. Similarly, an optimised proton flow reactor system for grid-scale electrical energy storage and bulk export of a hydrogenated carbon fuel will be constructed. Its data on roundtrip energy efficiency, energy densities, and material losses and recycling efficiency will be obtained.



Prof. John Andrews

Professor John Andrews is a leading international hydrogen expert with a BA (Nat.Sci.) and MA from Cambridge University, and a PhD from RMIT. He has published over 25 journal papers including the invention of the proton battery in 2014. He successfully led a project in 2018 proving for the first time the technical feasibility of a small-scale 'proton battery' with a carbon-based electrode. He currently leads a \$1 m R&D project on a proton flow reactor system for electrical energy storage and export of hydrogen as hydrogenated carbon powder funded by the Australian Renewable Energy Agency.



Prof. Hiroshige Matsumoto

Professor Matsumoto is one of Japan's leading hydrogen energy researchers. He is the leader of the electrolysis group in I2CNER at Kyushu University. Prof. Matsumoto is a specialist in solid state electrochemistry with a focus on water electrolysis using hydrophobic electrode and inorganic proton conducting metal oxide nanoparticles. He has worked with international partners on multiple projects including: the ARENA and Japan Society for Promotion of Science Bi-lateral program, JSPS-EPSRC Core-to-Core initiative, and NSF PIRE program.

Session 2

Renewable Energy R&D and the Innovation Ecosystem

This session focuses on the renewable energy ecosystem in Victoria, South Korea and Japan. Speakers from leading research institutes will share relevant government policies, existing opportunities, and potential funding avenues for future partnerships.

CSIRO Australia

Dr. Vicky Au

PhD CPA



Dr. Vicky Au has a PhD in Physics from the Australian National University and is a graduate of Harvard Business School's accelerated eMBA and a CPA. Dr. Au co-developed CSIRO's Hydrogen Industry Mission which is aimed at enabling Australia's hydrogen industry development through major collaborative research partnerships between industry, government, CSIRO and the broader research community. Dr. Au has also managed CSIRO's research informing the Federal Government's First Low Emissions Technology Statement of clean hydrogen, the State of Hydrogen 2021 report and Australia's co-lead role in the Mission Innovation 2.0 Clean Hydrogen Mission.

Korea Institute of Energy Research, South Korea

Dr. Yang Tae-Hyun

Director, Hydrogen Energy Research Division, Korea Institute of Energy Research



Dr. Yang holds a Ph.D in material science and engineering from Korea Advance Institute of Science and Technology. He is currently the Director in Hydrogen Energy Research Division at the Korea Institute of Energy Research (KIER). He currently serves as vice president of Korean Hydrogen and New Energy Society and the Korean Society for New and Renewable Energy. His current research focuses on the PEMFC design, evaluation and durability and unitised regenerative fuel cell. He has authored over 176 patents and 75 articles at international scientific journals.

Fukushima Renewable Energy Institute, Japan

Dr. Norihiko Iki

Deputy Director-General, Fukushima Renewable Energy Institute, AIST(FREA)



Dr. Norihiko Iki is Deputy Director-General of the Fukushima Renewable Energy Institute, AIST(FREA). His research focus is on gas turbine, turbo machinery, combustion and spray. He has over 25 years of research experience on combustion of the hydrogen carrier and cycle analysis of the thermal engine. Dr. Iki has a PhD from Tohoku University, Japan and has led multiple research projects throughout his career.

