

# HYDROGEN

Newsletter of the Centre for Hydrogen Innovations



Speakers and attendees of the Clean Energy Symposium (photos by CSD)

## Clean Energy Symposium 2025: Driving Innovation, Collaboration, and Transformation

On 4 September 2025, Newcastle Australia Institute of Higher Education, Centre for Sustainable Development (CSD), organised the Clean Energy Symposium. CHI had the great honour to be invited as a collaborator!

The event brought together more than 120 invited guests, with University of Newcastle Chancellor The Honourable Patricia Forsythe and His Excellency High Commissioner Allaster Cox, Patron of the CSD, delivering the welcome remarks.

The symposium convened thought leaders and practitioners from academia, industry, and the innovation ecosystem to explore the future of energy. Discussions highlighted the critical role of applied research, cross-sector collaboration, and emerging

partnership models in supporting and accelerating the global energy transition.

In Panel 1, Clean Fuels, speakers examined how green hydrogen, ammonia, and other next-generation technologies are beginning to reshape energy systems and value chains. Beyond the technical advances, the conversation underscored the need for new approaches to engineering design, research integration, and collaborative delivery. Participants also emphasised that building a sustainable clean-fuels industry will require sustained investment in education and workforce development, strong partnerships between stakeholders, and a shared, long-term vision connecting efforts across Singapore and Australia.

**Clean Energy  
Symposium 2025**

**CHI-SJTU Joint  
Workshop: Low  
Carbon  
Technologies**

**Registration  
opens for CHI-  
SEAS Short  
Course**

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Panel 2: Powering Our Energy Future expanded the discussion to encompass energy security, innovative investment models, and the critical role of workforce development. From reimagining cross-sector collaboration frameworks to building a skilled talent pipeline to implement and sustain these solutions, the dialogue underscored that successful energy transformation depends as much on people and policy as on technology.



**Dr Jessica Allen [moderator], Prof Behdad Moghtaderi, The Honourable Patricia Forsythe, Dr Xu Haoxin, A/Prof Salim Shaik, Prof Zhao Dan (left to right; photo by CSD).**

This event reminded us that energy transition is not just about technology, but also about people, policies, and partnerships. It was inspiring to see how Australia's deep expertise and Singapore's commitment to net-zero can come together to spark new opportunities. At the Centre for Hydrogen Innovations (CHI), we are excited to continue building these connections and working towards hydrogen technologies together!



**Mr Pierre Gouhier [moderator], Jackson, Prof Alan Broadfoot, Mr Shane Wong, Dr Shinnosuke Osafune (left to right; photo by CSD)**



**Event held at The St. Regis Singapore ballroom (photo by CSD)**



## Awarded grants and achievements

### Prof Yan honoured for Outstanding Graduate Mentor Award

Professor Yan Ning was honoured for his excellent and committed mentorship in nurturing the next generation of scholars and thought leaders. Under his guidance, his students have made many impactful research contributions, won prestigious awards at various international scientific competitions, and flourished in diverse and illustrious careers as academics, industry practitioners, and even entrepreneurs.



Photos: NUS

### 20 CHI faculty admitted to World's Top 2% Scientists 2025!



### 13 CHI faculty among 2025's most Highly Cited Researchers !



## Asst Prof Lum Yanwei awarded the 2025 WIN Rising Star Award!

Each year, the Waterloo Institute for Nanotechnology (WIN) Rising Star Award in Nanoscience and Nanotechnology recognises outstanding international researchers whose work aligns with WIN's Research Thematic Areas. Asst Prof Lum was honoured for his research on CO<sub>2</sub> conversion catalysis, highlighting the impact of his work in advancing sustainable and low-carbon technologies. Keep up the good work!



## CHI welcomes 3 new members, Asst Profs Ou Pengfei, Fu Xianbiao and Dr Ice Tee onboard!



CHI is delighted to welcome 3 new members to our growing community— (from top left to bottom right) Asst Profs Ou Pengfei (NUS Chem), Fu Xianbiao from the NUS Department of Materials Science and Engineering, and Dr Ice Tee from A\*STAR. Asst Prof Ou's research focuses on computational and AI for chemistry, while Asst Prof Fu's work centres on ammonia synthesis and utilisation. Dr Tee is researching advanced polymer composites for hydrogen storage. They contribute a versatile range of research areas and we look forward to their valuable contributions and collaborations in advancing hydrogen and low-carbon innovations.

## Research and Funding Highlights

We are pleased to share recent project awards that reflect our strong engagement with industry and national funding agencies, and our continued leadership in hydrogen and low-carbon technologies.

### Industry-funded project

In collaboration with an industry partner, Prof Yan Ning is leading a project to address impurity challenges in fatty acids, aiming to enhance process efficiency, reliability, and product quality for industrial applications.

### SMI-funded projects

A/Prof Yang Wenming (CHI and CDE Dept of Mechanical Engineering) is leading two SMI-funded initiatives focused on advancing ammonia as a low-carbon maritime fuel. The first project develops a next-generation in-cylinder reforming gas recirculation (IRGR) ammonia marine engine, targeting high efficiency and near-zero greenhouse gas emissions.

The second project focuses on the development of an AI-based integrated safety management system to enable safe handling, monitoring, and operation of ammonia fuel systems in the maritime sector.



# Symposiums, Workshops and Seminars

## NUS CHI-SJTU Joint Workshop 12 December 2025

CHI and Shanghai Jiao Tong University (SJTU), Low Carbon College (LCC)'s Prof. Chen Xi organised a workshop. We were joined by guest speaker, Dr Solmaz Nadiri, who is from Physikalisch-Technische Bundesanstalt. Prof Chen delivered a talk on hydrogenation of carbon dioxide using advanced catalysis. Dr Nadiri talked about reaction kinetics for energy systems. We were also joined by 5 student researchers from Prof Yan's group, who were originally from China, Japan, and Germany.

It was a wonderful day of academic exchange of knowledge and ideas that will lead to further collaborations such as student exchange and joint research!



## Distinguished speaker: Laureate Professor Behdad Moghtaderi 5 September 2025

We were honoured to host Laureate Professor Behdad Moghtaderi from the University of Newcastle (Australia) at the Centre for Hydrogen Innovations for an inspiring session on hydrogen-related R&D for industrial and defence applications. Professor Moghtaderi shared groundbreaking innovations from the University of Newcastle.

With leadership in over 200 projects worth nearly A\$100M, Professor Moghtaderi exemplifies the intersection of research, innovation, and impact. His work continues to shape the future of sustainable energy and decarbonisation in Australia and beyond.

## Prof Lee Kyungho 6 January 2026

Prof Lee talked about his research on ammonia synthesis using Ru-Based catalysts. He also outlined further directions towards next generation ammonia production system. He was a former researcher from NUS and this visit promoted closer collaboration between NUS and Korea University. This seminar was jointly organised by CHI and ChBE.



Laureate Professor Behdad Moghtaderi



A/Prof Chen Xi and Dr Solmaz Nadiri with Prof Yan's group



## Visit by Tianjin University students led by Prof Ji Na



Prof Ji Na from Tianjin University led an undergraduate student delegation to explore CHI's pioneering hydrogen research laboratory, learning about advanced catalyst development, ammonia combustion, and innovative applications. This immersive academic exchange strengthened collaborative ties between Tianjin University and CHI. We hope this inspired the students to consider furthering their postgraduate studies with us.



## NUS interest group and school visits to CHI

We were delighted to host three enthusiastic student groups recently. Two groups of students from Tanjong Katong Secondary School and Temasek Junior College joined us for a guided tour of our hydrogen R&D facilities. Members of 1.5degreeNUS, a NUS student group with a purpose to make sustainability accessible and integral to all disciplines, engaged with our team and explored how hydrogen-tech innovation is shaping the future.

We believe outreach like this is vital: building awareness, sparking curiosity and helping the next generation see how science and innovation can address real-world challenges. Thank you to the student groups for your energy, curiosity and thoughtful questions. We look forward to seeing how you carry these learning journey experiences forward in your studies and beyond! A heartfelt thanks also goes to the dedicated teachers and organisers whose efforts made these visits possible.



**From top (clockwise): 1.5DegNUS, Temasek JC students, and token of appreciation from Tanjong Katong Sec Sch**

# Join us at the World Hydrogen Energy Conference (WHEC) happening on 22 to 26 June 2026

The global hydrogen movement is gaining momentum — and WHEC 2026 will be the hub where innovation meets collaboration. Together, we'll explore breakthroughs, share knowledge, and forge partnerships to power a cleaner, sustainable future. Why attend?

- ◆ Meet world-leading hydrogen experts and industry pioneers
- ◆ Discover cutting-edge hydrogen technologies and strategies
- ◆ Shape the conversation around sustainable energy transition
- ◆ Gala Dinner at the world-renowned Gardens by the Bay, where innovation, sustainability, and elegance come together in a truly spectacular setting.

From breathtaking skyline views to an atmosphere of global connection, this will be a night to remember. Learn more and get ready to be part of the hydrogen revolution!

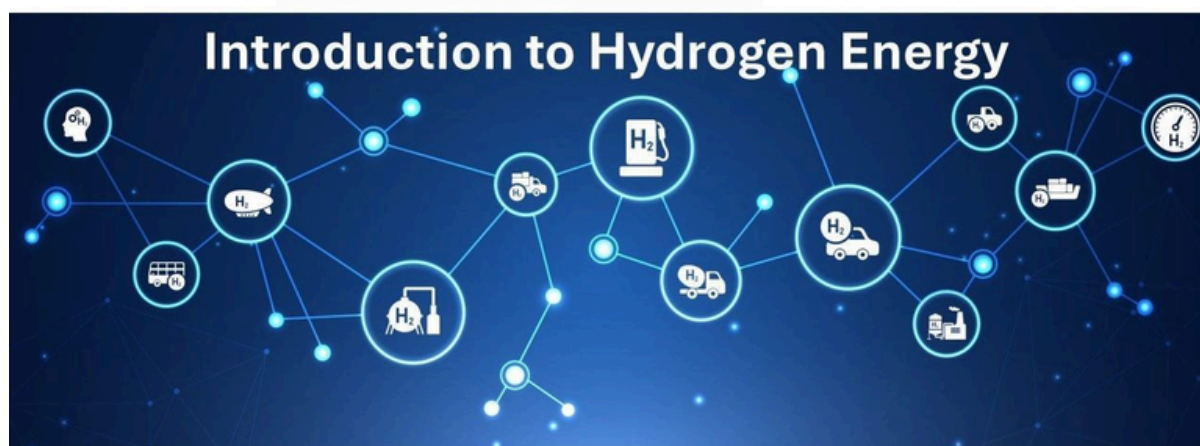
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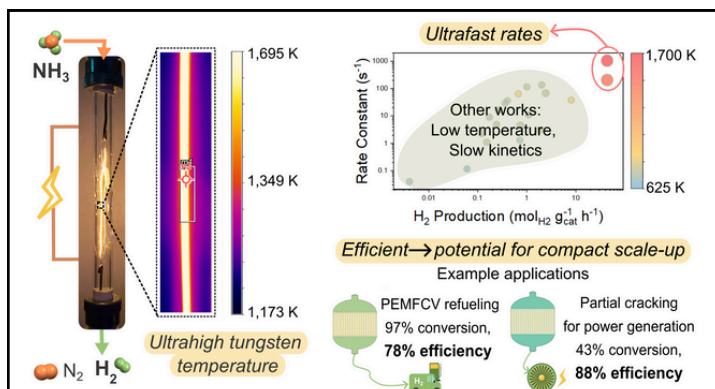
Centre for Hydrogen Innovations



## CHI-SEAS short course on “Introduction to Hydrogen Energy” second run on 3-4 Feb 2026

Are you ready to unlock exciting opportunities in the future of clean energy? We are excited to invite you to enrol in “Introduction to Hydrogen Energy”, a short course jointly offered by NUS CHI and Sustainable Energy Association of Singapore (SEAS) through the NUS SCALE. This course is designed for professionals and learners who want to understand how hydrogen is shaping the global energy transition and emerging markets across the Asia-Pacific region. Sign up at the NUS L3AP platform if you are interested!

## Research Highlights



**Nat. Chem. Eng. 2025, 2, 640**

### Ultrafast ammonia decomposition using an electrified tungsten wire lightbulb reactor

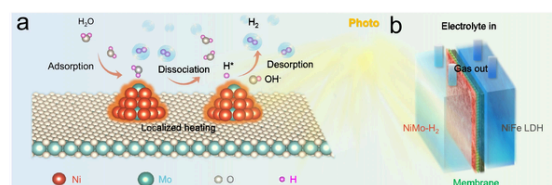
Indriadi K. S., Wong S. S., Han P., Wang S., Xu, D., Yan N.\*

Ammonia decomposition is a key reaction in the green hydrogen economy because ammonia is an important carbon-free hydrogen carrier. In contrast to the prevalent focus on developing active catalysts to address the reaction's slow kinetics at low temperatures, we introduce a tungsten wire lightbulb reactor that operates at unconventionally locally high temperatures while maintaining enhanced efficiency. The lightbulb reactor realised up to 99.995% conversion at enhanced power input without the use of additional separation steps.

### Photothermal-promoted anion exchange membrane seawater electrolysis on a nickel-molybdenum-based catalyst

Wu L, Lu W., Ong W. L., Ho G. W.\* et al.

Exploring active, durable catalysts and utilising external renewable energy sources offer notable opportunities for advancing seawater electrolysis. Here, a multifunctional catalyst is demonstrated for the alkaline seawater hydrogen evolution reaction. The in situ-generated nanoparticles have notable light absorption and photothermal conversion capabilities, enabling efficient localised photoheating. It was assembled into a photothermal anion exchange membrane electrolyser. This photothermal-promoted seawater electrolysis system shows notable potential for hydrogen production from seawater.



**Nat. Commun. 2025, 16, 3098**

### Unlocking cathodic potential dependent Pd deactivation for energy efficient $\text{CO}_2$ electroreduction to formate

Chen J., Aliasgar M., Kozlov S. M.\*, Wang L.\* et al.

**Nat. Commun. 2025, 16, 10169**

Pd-based materials are among the best electrocatalysts with high  $\text{CO}_2$ -to-formate selectivity. Herein, by constructing a palladium/fullerene catalyst, we achieve improved activity towards formate production and enhanced resistance to deactivation. The discoveries shed light on the complex mechanisms, highlighting its promise for energy-efficient  $\text{CO}_2$  conversion.

