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From Ammonia to High Purity Hydrogen – Australia's future renewable energy export on an international scale

Hosted by: Joint Chemical Engineering Committee

Event Details

The use of ammonia (NH_3) as a hydrogen vector can potentially enable renewable energy export from Australia to markets in Asia and Europe. With a higher hydrogen density than liquid H_2 , plus existing production and transport infrastructure, and well-developed safety practices and standards, the financial and regulatory barriers to this industry are lower than for liquid H_2 transport. The only significant technical barrier which remains, however, is the efficient utilisation of ammonia fuel at the near the point of use, either directly or through the production of H_2 .

For H_2 production from NH_3 , the purity of the product H_2 is the prime consideration. As NH_3 can degrade the polymer electrolyte in PEM fuel cells, the relevant purity standard for mobile PEM fuel cell applications (ISO14687-2) sets a maximum NH_3 concentration of just 0.1 ppmv. Furthermore, the allowable N_2 limit is 100 ppmv N_2 due to the significant energy penalty that N_2 introduces during compression, as well as the risk of NH_3 formation through reaction with H_2 .

Of currently available H_2 separation technologies, metal membranes show particular promise as they combine infinite H_2 selectivity (*i.e.*, a 100% pure H_2 product, assuming a defect-free membrane), high temperature operation (comparable to that required for NH_3 decomposition) and tolerance to NH_3 . CSIRO, in a collaboration with BOC/Linde, is demonstrating a pilot-scale ammonia-to-hydrogen system which integrates vanadium-based membranes with a cracking catalyst to produce high-purity H_2 directly from NH_3 , at a rate of at least 5 kg H_2 per day. Please read ABC report - demonstration day at CSIRO QCAT. <http://www.abc.net.au/news/2018-08-08/hydrogen-fuel-breakthrough-csiro-game-changer-export-potential/10082514>

When scaled and deployed at FCEV refuelling stations, this technology will help enable a renewable ammonia export industry from Australia to the major economies of Asia and beyond.

About the Speaker – Dr Michael Dolan

Michael Dolan is a Principal Research Scientist and Team Leader with CSIRO Energy in Brisbane. Michael leads a team which investigates H_2 production from a range of fossil and renewable resources, a key aspect of which is the development of hydrogen-selective metal membranes. This technology is presently being demonstrated at the pilot-scale for the generation of high-purity H_2 from ammonia, work which is central to the establishment of a renewable hydrogen export industry in Australia. Michael holds a B.App.Sc (Hons) and PhD from La Trobe University, and an MBA from Torrens University. He has published more than 50 research papers on energy-related materials and processes.

VENUE

Engineers Australia Auditorium,
G/F,8 Thomas Street
Chatswood NSW 2067

DATE & TIME

Tuesday 09th Oct 2018
6:00 pm for 6:30pm start

Light refreshments and beverage
will be served prior to the
presentation.

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TICKETS (incl. GST)

ICHEME & EA Members: Free
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COB Thurs 04th October 2018

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