Monash Renewable Chemicals and Fuels Project

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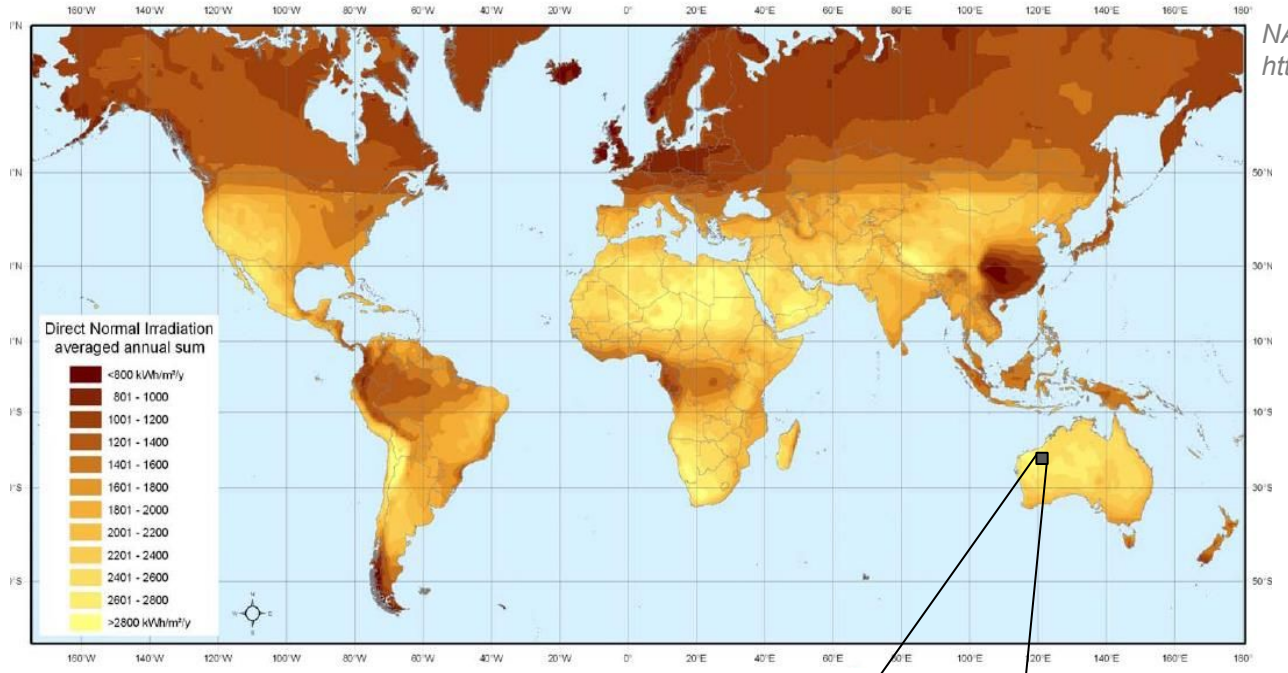
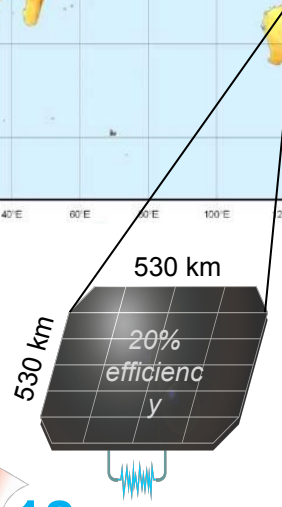
Assoc.Prof. Alexandr N. Simonov

MONASH University

Australian renewables opportunities



NASA SSE 6.0
http://eosweb.larc.nasa.gov/sse/

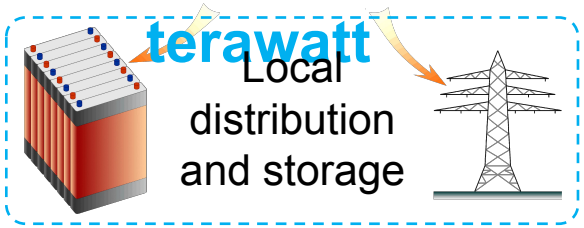


Worldwide transportation and long-term storage of renewables to the requires sustainable energy carriers:

H_2 and NH_3

generated by renewable-powered

18 terawatt

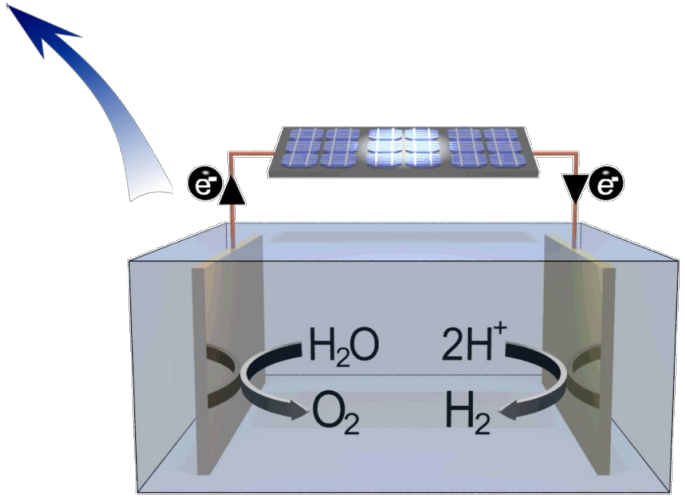


Water Splitting at Monash

Bubble-free electrolyser technology:

2005-ongoing: Overcoming the mass transport limitations to boost the efficiency and purity of produced H_2 and O_2. Commercialised through a spin-out company

AQUAHYDREX



Energy & Environmental Science

22% solar to H_2 efficiency

Renewable fuels from concentrated solar power: towards practical artificial photosynthesis†

Cite this: DOI: 10.1039/c5ee02214b

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Developing the next generation hydrogen energy system:

ENERGYS READY TO GO

Low-cost, robust, high-activity water splitting electrodes:

ARENA Australian Government Australian Renewable Energy Agency

Australian National University

Electrocatalysts and Device for Sea Water Electrolysis to Hydrogen:

woodside

Versatile water electrolysis systems based on liquid-to-gas separator-electrode assemblies

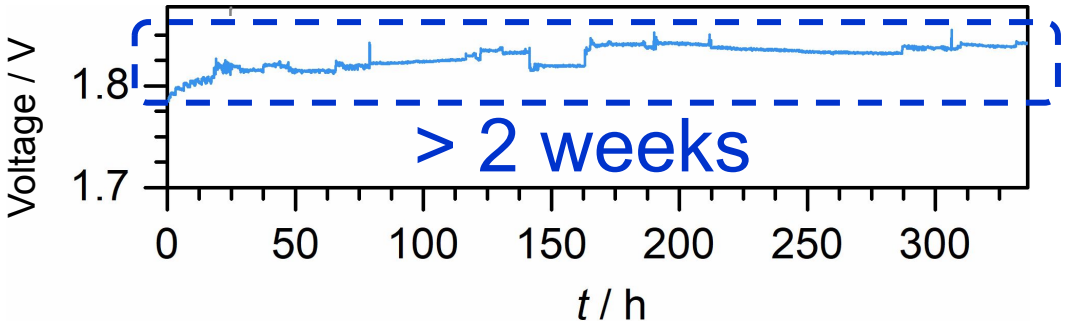
Office of Naval Research ONR Science & Technology

THE UNIVERSITY OF SYDNEY

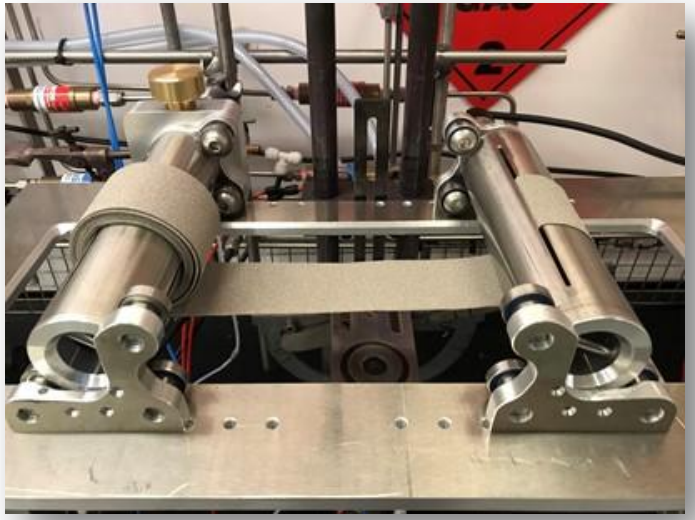
Green Hydrogen

"New chemistry" of catalytic electrodes

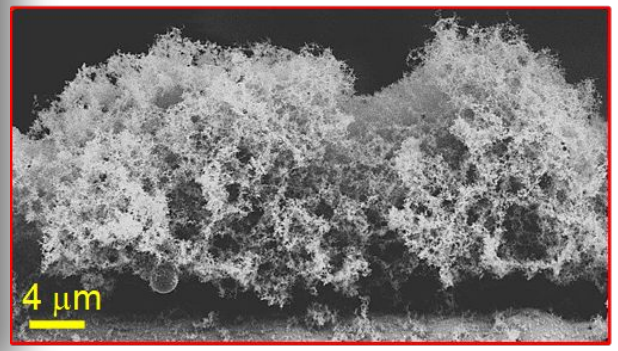
√ No iridium and similarly expensive/rare elements
√ Robust operation in strong acid/alkali and saline water
√ Outstanding stability up to 80 °C in liquid electrolytes



Roll-to-roll flame spray electrode fabrication

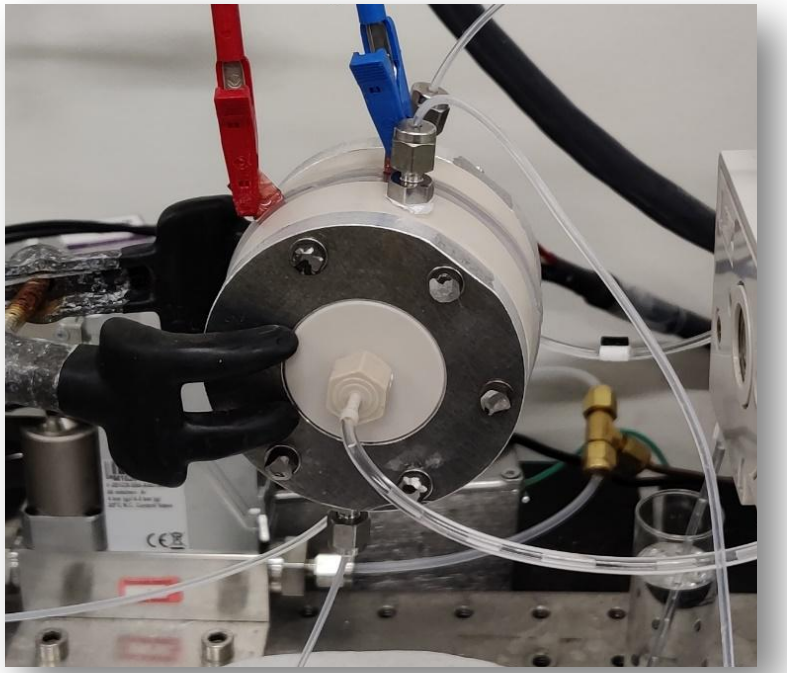


Australian National University



New membrane-free electrolyser designs

√ High-conductivity inorganic electrolytes
√ Minimal ohmic losses
√ Flexible substrates, ready for roll-to-roll fabrication
√ Translation to seawater electrolysis

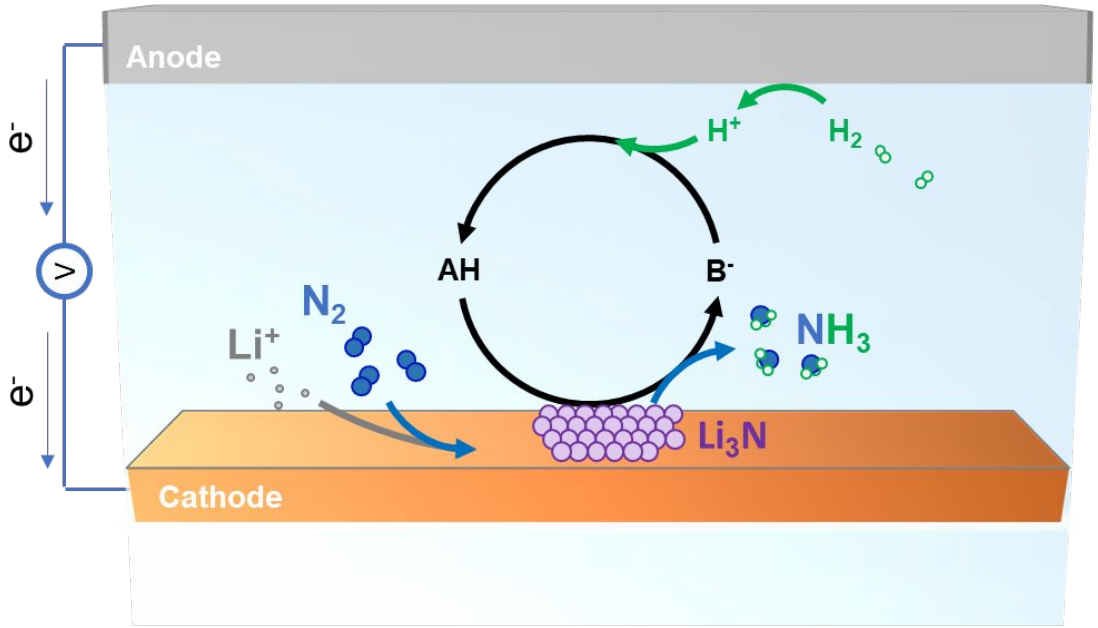


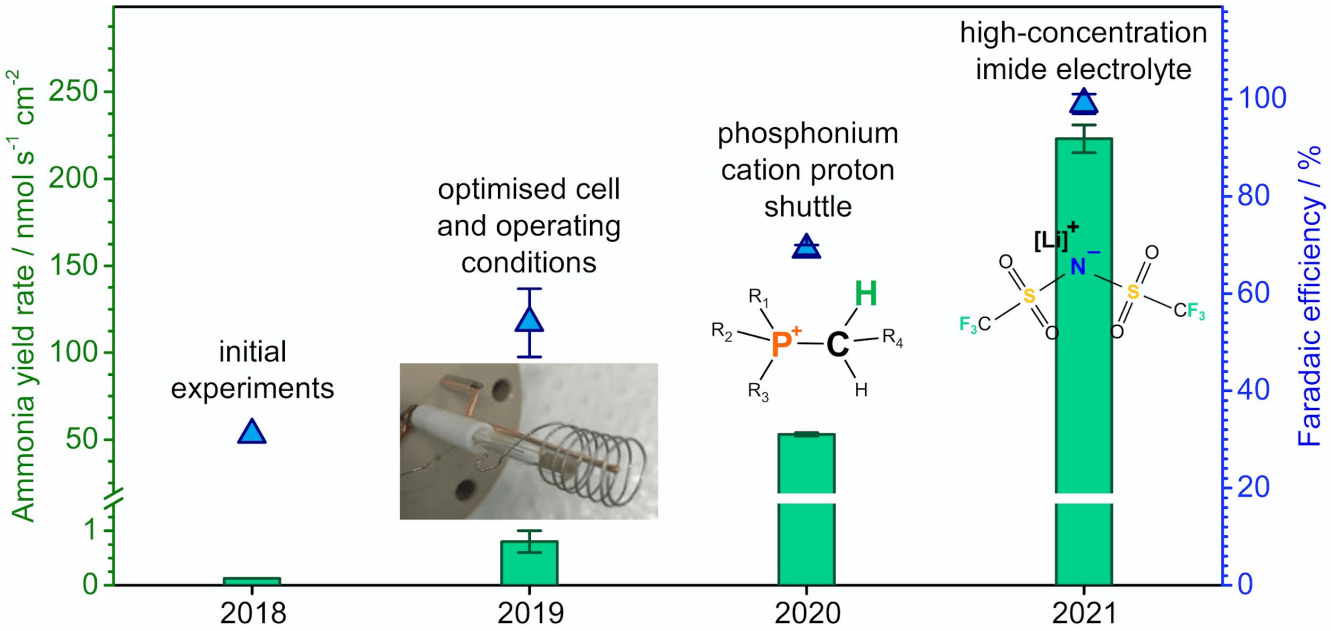
Green Ammonia

Ammonia from renewable energy, water and air

√ Almost 100% current-to-ammonia efficiency
√ Practical rates approaching DoE REFUEL targets
√ Robust operation over several days

Science **Nature**



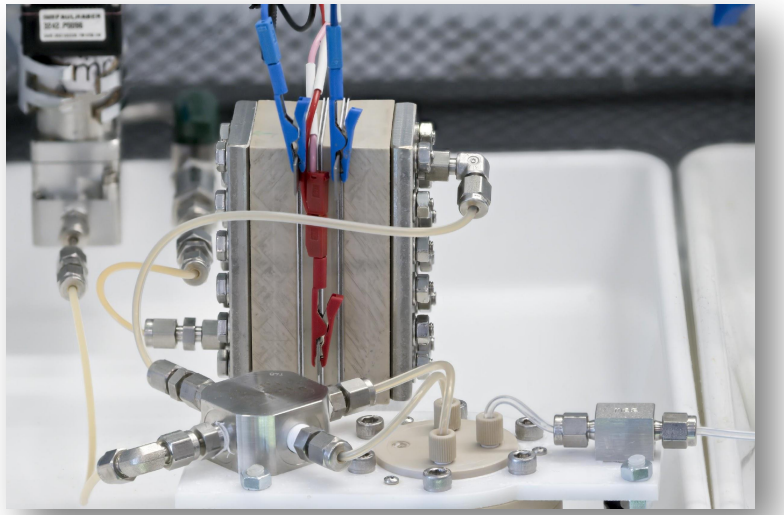


Jupiter Ionics Pty Ltd

Spin-out company established to scale-up Monash green ammonia technology

√ First green ammonia fertiliser application, Dec 2021

√ Partners include FFI and WesCEF



100 g/day, TRL4

~1 kg/day

~200-500 tpa

Image credits: Nel & ITM power