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ABSTRACT:

Innovation in Energy Materials for Green Hydrogen Production and Storage

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Green hydrogen production and storage is deemed as a promising pathway to the net zero economy. The concept of net zero is about decarbonising the energy supply and hydrogen as the cleanest energy vector is very promising. When economically produced, particularly from renewable energy sources, hydrogen can fuel maritime, aviation and land transport without producing any pollutant or carbon dioxide.

Energy materials such as electrodes, membranes, catalysts and photocatalysts are fundamental to the performance of systems for green hydrogen production and storage. Research advances and innovation in developing such materials for electrolysis and photocatalysis are critical to the successful scaling up of green hydrogen production. Solid state hydrogen storage materials hold the promise for overcoming the bottleneck of hydrogen storage and infrastructure for transport and distribution. Some promising low-pressure and safe storage materials have advanced to large scale applications. Iterative research and innovation will be key to lowering the cost and enhancing performance in green hydrogen technologies.

This lecture will provide some insights and perspective into the technological challenges and opportunities in these emerging fields, and how researchers might go about commercialising promising materials to enable the transition to a cost-effective hydrogen infrastructure and delivery system, towards the net zero future around 2050.