

Hydroxide (Anion) Exchange Membrane Electrolyzers for Green Hydrogen at the University of Delaware and Versogen

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Abstract

The transition to a low carbon economy to avoid climate change requires green hydrogen to decarbonize the sectors of our economy that are inaccessible by green electrons, such as ammonia synthesis, steel production, and long duration grid energy storage. For the past 15+ years, my research group has been focused on electrochemical engineering, catalysis, and materials for hydroxide exchange membrane (HEM) based electrochemical devices including electrolyzers (HEMELs), fuel cells (HEMFCs), and carbon capture (HEMCC). The use of a HEM provides these electrochemical devices with an alkaline operating environment and thus may eliminate the need for precious metal catalysts and expensive stack components like titanium bipolar plates and porous transport layers. In this presentation, I will share our efforts on the design, synthesis, and commercialization of polymer hydroxide exchange membranes that started in the mid-2000s, and the engineering and scale up of HEMELs.

About the Speaker

Prof. Yushan Yan is the Henry B. du Pont Chair of Chemical and Biomolecular Engineering and the Founding Director of Center for Clean Hydrogen (CCH) at the University of Delaware. CCH is a partnership of the University of Delaware, Chemours, Plug Power, and the National Renewable Energy Laboratory and its mission is to help accelerate the energy transition by providing testing capability for green hydrogen stacks and components at scale i.e., MW scale. CCH also performs research aiming to reduce the cost of green hydrogen by developing better materials, simpler stack designs, and faster manufacturing methods and trains the next generation of electrochemical engineers and entrepreneurs. As a researcher, he has spent the past 25+ years working on hydrogen technologies and the past 15+ years solely on hydroxide (anion) exchange membrane (AEM) electrolyzers, fuel cells, and carbon capture. As an entrepreneur, he has been an inventor and advisor for NanoH₂O which was acquired by LG Chemicals, a Cofounder of Repair, and the Founder and CEO of Versogen, a University of Delaware spinout dedicated to the commercialization of AEMs and AEM electrolyzers discovered in his university research lab. As an educator, he has trained 30+ PhD students and 30+ postdocs and 20+ of them hold faculty positions. He has been a Web of Science Highly Cited Researcher and was elected to the National Academy of Engineering for his contributions to electrochemical engineering, catalysis, and materials. He received his BS in Chemical Physics from the University of Science and Technology of China and PhD in Chemical Engineering from the California Institute of Technology.

All are welcome