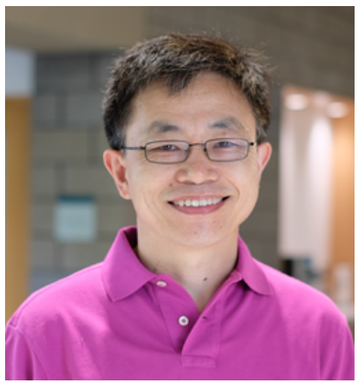
Johns Hopkins University

Department of Chemical & Biomolecular Engineering

Spring 2023 Seminar Series

Professor Yushan Yan
University of Delaware

Date: Thursday, February 16, 2023
Time: 10:30 a.m.
Location: Shaffer Hall 3
Zoom Meeting ID: 919 5918 2879
Passcode: 270887



Title: Accelerating the Energy Transition: Green Hydrogen, Fuel Cells and Carbon Capture

Abstract: The transition to a low carbon economy to avoid the climate change requires green hydrogen, fuel cells and carbon capture. Green hydrogen is necessary for the decarbonization of the sectors of our economy that are inaccessible by renewable electrons, such as ammonia synthesis. For low temperature electrolzyers for green hydrogen generation and fuel cells for transportation, polymer electrolytes play a central role in controlling their cost, performance, and durability, and consequently their economic viability. In this presentation, I will focus on our work on hydroxide exchange membrane electrolyzers (HEMELs) and fuel cells (HEMFCs) that do not require precious metal catalysts and expensive stack components. I will also show our recent work on carbon capture using hydroxide exchange membrane fuel cells.

References

1. Xiao, J. W.; Oliveira, A. M.; Wang, L.; Zhao, Y.; Wang, T.; Wang, J. H.; Setzler, B. P.; Yan, Y. S., Water-Fed Hydroxide Exchange Membrane Electrolyzer Enabled by a Fluoride-Incorporated Nickel-Iron Oxyhydroxide Oxygen Evolution Electrode. ACS CATALYSIS 2021, 11 (1), 264-270.

2. Wang, J. H.; Zhao, Y.; Setzler, B. P.; Rojas-Carbonell, S.; Ben Yehuda, C.; Amel, A.; Page, M.; Wang, L.; Hu, K.; Shi, L.; Gottesfeld, S.; Xu, B. J.; Yan, Y. S., Poly(aryl piperidinium) membranes and ionomers for hydroxide exchange membrane fuel cells. NATURE ENERGY 2019, 4 (5), 392-398.

3. Setzler, B. P.; Zhuang, Z. B.; Wittkopf, J. A.; Yan, Y. S., Activity targets for nanostructured platinum group-metal-free catalysts in hydroxide exchange membrane fuel cells. NATURE NANOTECHNOLOGY 2016, 11 (12), 1020-1025.

4. Shi, L.; Zhao, Y.; Matz, S.; Gottesfeld, S.; Setzler, B. P.; Yan, Y. S., A shorted membrane electrochemical cell powered by hydrogen to remove CO2 from the air feed of hydroxide exchange membrane fuel cells. NATURE ENERGY 2022, 7 (3), 238-247.

Bio: Yushan Yan is the Henry B. du Pont Chair of Chemical and Biomolecular Engineering and Founding Director of Center for Clean Hydrogen at the University of Delaware. He is also Founder and CEO of Versogen and Cofounder of RepAir. He was the Founding Associate Dean for Research and Entrepreneurship at the University of Delaware, Department Chair at the University of California Riverside, and Senior Staff Engineer and Project Leader at AlliedSignal. His recognitions include the R. H. Wilhelm Award for Chemical Reaction Engineering, the Braskem Award for Excellence in Materials Science and Engineering, and the Nanoscale Science and Engineering Forum Award from the American Institute of Chemical Engineers; the Carl Wagner Memorial Award and the Energy Technology Division Research Award from the Electrochemical Society; the Donald Breck Award from the International Zeolite Association; Fellow of the American Association for the Advancement of Science, the National Academy of Inventors, and the Electrochemical Society; Highly Cited Researcher by Web of Science, and Member of the National Academy of Engineering. His research has led to 300+ publications (38,000+ citations, h-index = 103, Google Scholar) and 20+ issued US patents that have contributed to startups e.g., NanoH2O, RepAir, and Versogen. 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.