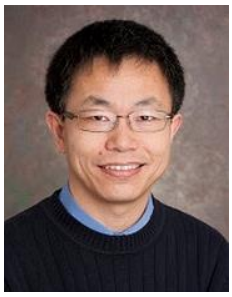

Prof Yushan Yan

Distinguished Engineering Professor
Department of Chemical and Biomolecular Engineering
Associate Dean for Research and Entrepreneurship
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Prof Yushan Yan is the Distinguished Engineering Professor in the Department of Chemical and Biomolecular Engineering and the Associate Dean for Research and Entrepreneurship for the College of Engineering at the University of Delaware. He studied Chemical Physics (BS) at the University of Science and Technology of China (1983-1988), Heterogeneous Catalysis at the Dalian Institute of Chemical Physics of the Chinese Academy of Sciences (1988-1992), and Chemical Engineering (MS & PhD) at the California Institute of Technology (1992-1996).

He worked for AlliedSignal Inc. as Senior Engineer and Project Leader before joining the faculty at the University of California at Riverside (UCR) (Assistant Professor, 1998; Associate Professor, 2002; Professor, 2005; University Scholar Professor, 2006-2010; Department Chair 2008-2011; and University of California Presidential Chair 2010). He was elected Fellow of the American Association for the Advancement of Science (2008) and was recognized by the International Zeolite Association with the Donald Breck Award for his zeolite thin film research (2010) and the Nanoscale Science and Engineering Forum Award by the American Institute of Chemical Engineers for nanoporous thin films and nanocatalysts for fuel cells (2016). He chaired the Gordon Research Conference for Nanoporous Materials of 2013.

His research has been supported by industry and governmental agencies including the National Science Foundation, Department of Defense, Environmental Protection Agency, and Department of Energy. Notably he was one of 37 awardees in the Department of Energy's ARPA-E OPEN 2009 (the inaugural open call for proposals that received about 3700 concept papers) for his fuel cell technology and one of 66 awardees in OPEN 2012 for his redox flow battery concept. He has supervised 29 postdocs, 24 PhD students, 12 MS students, 33 undergraduate students, 7 high school students, and 12 visiting faculty. Nineteen of his former postdoc and PhD students hold faculty positions in China, Australia, Canada, and US.

At UCR, he served as AIChE Chapter Advisor for 5 years, hosted the Western Regional Student Conference, led the first ABET 2000 accreditation process for 4 years for both chemical and environmental engineering programs, chaired Faculty Search Committee, and served as the Department Chair for 3 years. He has also organized/chaired many sessions/symposiums in various national and international meetings.

He has been an inventor on 25+ issued and pending patents, some of which were licensed to form startup companies including Pacific Fuel Cell Corp, NanoH2O, Full Cycle Energy, Zeolite Solution Materials, OH-Energy, DEGi Chlorine, and DEGi Storage. He has served these startups in the capacity of cofounder, chief scientific advisor, and advisory board member. The nanocomposite desalination membrane technology he coinvented was commercialized by NanoH2O that was acquired by LG Chemicals in 2014. He has delivered ~190 invited lectures including Plenary, Keynote, and Named Lectures in major international conferences and chemical engineering departments. His 210+ published articles have been widely cited in the scientific community (h-index = 60, average citation/paper = 57, total citation = 12,000+) and extensively covered by the media, e.g., New Scientist, C&EN News (ACS), Materials Today, Materials 360 (MRS), Chemical Engineering Progress (AIChE), Business Week, China Press, Chinese Daily News, The News Journal, CNN.com, CNBC, KABC, and VOA.

Flow Batteries: Novel Designs, Materials, and Cost Models

Abstract:

One of the grand challenges facing humanity today is the development of an alternative energy system that is safe, clean, and sustainable and where combustion of fossil fuels no longer dominates. A distributed renewable electrochemical energy and mobility system (DREEMS) could meet this challenge. At the foundation of this new energy system, we have chosen to study a number of electrochemical devices including fuel cells, electrolyzers, and flow batteries. We have been working on the development of hydroxide exchange membrane fuel cells (HEMFCs) and electrolyzers (HEMELs) which can work with nonprecious metal catalysts and inexpensive hydrocarbon polymer membranes. More specifically we have developed a roadmap for HEMFCs and HEMELs, the most chemically stable membranes, and the most active nonprecious metal catalysts. We have also studied why hydrogen oxidation reactions are slower in base than in acid for precious metal catalysts. In this presentation, I will focus on our flow battery work highlighting novel designs, materials and cost models e.g., double membrane aqueous flow batteries with high voltages (i.e., 3 V), oxidation resistant membranes, and user friendly cost models.