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 are a number of electrochemical devices including fuel cells, electrolyzers, and flow batteries. For all these devices polymer electrolytes and electrocatalysis play a critical role in controlling their performance and cost, and thus their commercial viability. This presentation will focus on the recent work on hydroxide exchange membrane fuel cells which can work with non-precious metal catalysts and inexpensive polymer electrolytes, and thus can be economically viable. More specifically the speaker will show how they have discovered a super-stable organic cation, why hydrogen oxidation reactions are slower in base than in acid, and what, they have developed as the most active non-precious metal hydrogen oxidation reaction catalysts.

About the speaker

Yushan Yan is the Distinguished Engineering Professor and the Associate Dean for Research and Entrepreneurship of the College of Engineering at the University
of Delaware. He received his B.S. in Chemical Physics from the University of Science and Technology of China (1983-1988), and Ph.D. in Chemical Engineering from the California Institute of Technology (1992-1996). He studied heterogeneous catalysis at the Dalian Institute of Chemical Physics of the Chinese Academy of Sciences (1988-1992). His prior appointments include Senior Staff Engineer at AlliedSignal Inc. (1996-1998) and faculty member at the University of California Riverside (1998-2011) (Assistant Professor, 1998-2002; Associate Professor, 2002-2005; Professor, 2005-2011; Department Chair, 2008-2011; University Scholar, 2006-2010; University of California Presidential Chair, 2010-2011). He was elected a Fellow of the American Association for the Advancement of Science (2008) and recognized by the International Zeolite Association with the Donald Breck Award (2010) for his zeolite thin film research. He was one of 37 awardees in the US Department of Energy’s ARPA-E OPEN 2009 (1st open call for proposals) for his fuel cell technology and one of 66 awardees in OPEN 2012 (2nd open call for proposals) for his redox flow battery concept. He has been an inventor on a number of issued or pending patents, some of which were licensed to form startup companies (e.g., NanoH2O and OH-Energy). His research has been widely cited in the scientific community (9300+ total citations and h-index = 53) and extensively covered by the media including New Scientist, Business Week, C&EN News, Materials Today, MRS 360, Chemical Engineering Progress, China Press (newspaper) and Chinese Daily News (newspaper), CNBC, CNN.com, KABC, and VOA.

*All are Welcome!*

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