

Tackling Energy Storage Challenges Using Thermo-fluid Sciences

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Abstract:

The combination of energy shortage and climate change is one of the most complex challenges the world, as a whole, has had to face. The next 50 years is a vital period for human civilization and it is imperative that we revolutionize the way we produce and store energy and incorporate renewables as our primary source of energy. This talk will provide a snapshot of the future of the sustainable energy landscape and identify several game-changing technologies that will facilitate the widespread deployment of renewables. In particular, we will highlight our recent advances in redox flow batteries, and lithium-oxygen battery technologies achieved through an interdisciplinary approach that combines thermal-fluid science and electrochemistry. The scientific issues and practical challenges pertaining to this advanced battery will be discussed, with a particular emphasis on how the challenges can be addressed using thermo-fluid sciences.

Bio:

T.S. Zhao is currently the Cheong Ying Chan Professor of Engineering and Environment, the Chair Professor of Mechanical & Aerospace Engineering at HKUST, the Director of the HKUST Energy Institute, and a Senior Fellow of the HKUST Institute for Advanced Study. He is an elected Fellow of the American Society Mechanical Engineers (ASME), Fellow of the Royal Society of Chemistry (RSC), and a Highly Cited Researcher by Thomson Reuters (2014, 2015, 2016, 2017, 2018).

Professor Zhao combines his expertise in research and technological innovation with a commitment to creating clean energy production and storage devices for a sustainable future. He has made seminal contributions in the areas of fuel cells, advanced batteries, multi-scale multiphase heat and mass transport with electrochemical reactions, and computational modeling. In addition to 5 edited books, 9 book chapters and over 70 keynote lectures at international conferences, he has published 331 papers in various prestigious Journals. These papers have collectively received more than 13,000 citations and earned Prof Zhao an h-index of 62 (Web of Science). In recognition of his research achievements, Prof Zhao has in recent years received many awards, including the 2014 Distinguished Research Excellence Award (HKUST), two State Natural Science Awards, Ho Leung Ho Lee Scientific and Technological Advancement Award (2018), the Croucher Senior Fellowship award, the Overseas Distinguished Young Scholars Award (NSFC), and the Yangtze River Chair Professorship, among others.

In the international community, Prof Zhao serves as Editor-in-Chief of *Applied Thermal Engineering*, Executive Editor of *Science Bulletin*, and Editor of RSC's *Energy & Environmental Science*. He has served as an editorial board member for *Energy & Environmental Science*, *Journal of Power Sources*, and other 10 prestigious international Journals.