CONFERENCE WEBSITE

https://www.iage-net.org/igec2021

2021 International Green Energy Conference

(IGEC-XIII)

July 15-18, 2021 | Tianjin, China

Name	**Zhiguo Qu**
Affiliation	**Xi'an Jiaotong University**

Invited Plenary Lecture

Presentation Title	**Nanofluidic Ionic Osmotic Energy Conversion with Thermal Modulation**
Abstract (Approximately 200 words)	Ions are significant energy carriers for energy conversion and storage. Nanofluidic ionic osmotic energy conversion could directly convert salinity-gradient energy and solar energy into electricity, and its physical essence is nanofluidic based ion selective diode transport process. However, the coupled ion transport and heat transfer inside nanofluidic channel is lack of unified physical cognition, and the corresponding osmotic power density is still relatively low which limits its practical applications. Following the approach of "Understanding microscopic physical process-Clarifying mesoscopic coupled heat and mass transfer-Optimizing macroscopic performance", the anisotropic ion diffusion behavior on the solid-liquid interface of nanoporous membranes has been investigated via first principle simulation. In addition, a dimensionless analysis is carried out with respect to the coupled Poisson-Nernst-Planck equation and Navier-Stokes equation. Under this circumstance, the dimensional multi-physical ion transport in nanofluidic channel and osmotic energy conversion is unified by a reduced number of dimensionless governing parameters, contributing to the alleviation of future experimental burden. Facing the challenge of low osmotic power density, we proposed the route of "solar photothermal enhanced ionic osmotic energy conversion under salinity-gradient". Due to the thermal modulation induced by solar energy, the ion selective transport capability is highly consolidated. Consequently, the ionic osmotic power density breakthrough 10 W/m^2 under 1 sun and sea/river water salinity-gradient, promoting the osmotic energy conversion into potential applications.
Biographical Sketch (Approximately 200 words)	Zhiguo Qu is Professor at Xi'an Jiaotong University, China. He received his PhD degree in Power Engineering and Engineering Thermophysics in 2005 from Xi'an Jiaotong University. He has worked in the Advanced Heat Transfer Company and the Pennsylvania State University as a visiting scholar. In 2020, He was supported by the National Natural Science Foundation for Distinguished Young Scholars. His research mainly focuses on Efficient Heat and Mass Transfer, Micro and Nano Energy Conversion, and Hydrogen & Fuel Cell Technologies. He published 282 papers, including 175 SCI Journal Paper (First/Corresponding Author 132) with an H index of 41 from Google Scholar. He also has 3 chapters for English book and 54 authorized invention patents. Besides, he involves in formulating a national standard, and he has been invited 28 times for presentation in conferences. He received the First Prize of Shaanxi Province Science Award (in 2020, ranked No.1), the Second Prize of National Scientific and Technological Progress Award (in 2015, ranked No.2), the Second Prize of National Technical Invention Award (in 2009, ranked No.3), and the First Prize of National Scientific and Technological Progress Award (Innovation Team, in 2017, ranked No.6).