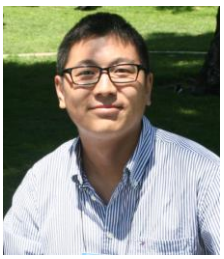
Dr. L. An
Assistant Professor
Department of Mechanical Engineering
The Hong Kong Polytechnic University
Hung Hom, Kowloon, Hong Kong
Email: liang.an@plyu.edu.hk



Carbon-Neutral Energy Conversion Technology: Direct Ethanol Fuel Cells

Direct ethanol fuel cells (DEFC), which promise to be a clean and efficient energy production technology, have recently attracted worldwide attention, primarily because ethanol is a carbon-neutral, sustainable fuel and possesses many unique physicochemical properties including high energy density and ease of transportation, storage as well as handling. However, conventional DEFCs that use acid proton exchange membranes (PEM) and precious metal catalysts result in rather low performance. In our research, we used alkaline anion exchange membranes (AEM) as the ion conductor in DEFCs. The change from the acid membrane to an alkaline one led to a significant performance boost: the power density increases from 30 mW cm^{-2} to 90 mW cm^{-2}. In addition, we developed a novel hybrid DEFC system, which consists of an alkaline anode and an acid cathode. Our unique design results in a power density of 240 mW cm^{-2}. To further optimize and improve performance, we developed an integrated model for the fuel cell system. By doing so, the power density of DEFCs now is as high as 360 mW cm^{-2}. This high performance is attributed not only to the unique design, but also to the use of the integrated model.

Biography
Liang An received BEng degree in Thermal and Power Engineering from Harbin Institute of Technology in 2008, and PhD degree in Mechanical Engineering from The Hong Kong University of Science and Technology in 2012. He is currently an Assistant Professor in Department of Mechanical Engineering at The Hong Kong Polytechnic University. He has authored and co-authored more than 60 journal papers. His research interests include renewable energy conversion and storage technologies, such as fuel cells and flow batteries.

Presenting author details
Full name: An Liang
Contact number: (852) 2766 7820
Session name/ number: Renewable and Sustainable Energy
Category: Oral presentation