

Direct Methanol Fuel Cell – A Sustainable Energy Technology

T.S. Zhao

Dept of Mechanical Engineering
The Hong Kong University of Science & Technology
Clear Water Bay, Kowloon, Hong Kong SAR, China

ABSTRACT: The energy shortage and environment deterioration are fundamental challenges for humanity in this century. Therefore, creating the next generation of highly efficient and clean energy-conversion technologies is becoming crucially important. Fuel cells have recently been the focus of intense research and development for powering the next generation of road vehicles, for distributed power generation, as well as for powering small portable devices such as cellular phones and laptop computers. Among various types of fuel cell, the direct methanol fuel cell (DMFC) is one of the most advanced low-temperature electrochemical device that converts chemical energy of liquid methanol (MeOH) directly into electrical energy. This lecture will give an overview of the DMFC technology, including its advances, challenges and opportunities. Both actively and passively operated DMFCs will be covered. Some important fundamental issues, such as the development of nano-electrocatalyst and high-performance membranes and coupled heat/mass transport and electrochemical reactions, will be addressed. Some DMFC prototypes will be demonstrated at the end of the lectures.

Keywords: energy-conversion technology, fuel cell, DMFC.

Biography:

Professor T.S. Zhao received his B.S. (1983) and M.S. (1986) in Thermophysical Engineering from Tianjin University, China, and his Ph. D. (1995) in Mechanical Engineering from the University of Hawaii at Manoa, USA. He joined HKUST in 1995 as Assistant Professor and was promoted to Associate Professor in 2001 and to Professor in 2006. He is presently the Acting Head of Mechanical Engineering at HKSUT. Prof. Zhao has published more than 120 papers in refereed archival journals in the fields of mechanical engineering, physics and electrochemistry. He has also contributed 3 book chapters and was awarded a US patent. In addition, he has presented numerous plenary/keynote lectures at important international conferences. In the international community, he serves as Editor-in-Chief of *Advances in Fuel Cells* (Book series, Elsevier), Asian Regional Editor of *Applied Thermal Engineering*, and as a member of the Editorial Board for 10 International Journals. He is a member of the Hong Kong Research Grants Council (RGC) Engineering Panel.