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Advances in Micro and Miniature Passive Direct Methanol Fuel cellsÂ

Abstract: The 21st century will see the development of a wide range of active micro and miniaturized fuel cells with applications in energy management and power sources, electronic cooling, energy storage, security and bioengineering. Although these active devices are effective, they are often cumbersome and inefficient because of the auxiliary supporting devices, such as pumps, fans, and other moving parts that they require for operation. A more efficient and novel approach involves the use of passive small energy and thermal devices with no moving parts. Passive Direct Methanol Fuel Cells (DMFC) will be presented in this talk. Advances and innovations in micro and miniature passive DMFCs, including fuel cell stack and ancillary systems with no moving parts, will be presented both experimentally and numerically. Auxiliary systems take passive approaches to fuel storage and delivery, air breathing, water management, CO₂ release and thermal management. The performance characteristics of the passive miniature DMFC system will be discussed.

Biography: Professor Amir Faghri joined the University of Connecticut in 1994 and served as Head of the Mechanical Engineering Department from 1994-1998, and Dean of the School of Engineering from 1998-2006. Dr. Faghri has authored four books, more than 280 archival technical publications (including 180 journal papers), and holds seven U.S. patents. Dr. Faghri has served as a principal investigator conducting research in the area of thermal management and multiphase transport phenomena for applications ranging from advanced cooling systems to alternative energy systems, including heat pipes, fuel cells, solar energy systems and thermal energy storage devices. Dr. Faghri has received numerous external research contracts and grants from the National Science Foundation, Department of Energy, National Aeronautics & Space Administration, Department of Defense, Department of Education and various industries. Dr. Faghri is presently serving on the editorial board of seven scientific journals. Dr. Faghri has received many honors and awards, including the 1998 American Institute of Aeronautics & Astronautics (AIAA) Thermophysics Award, the 1998 American Society of Mechanical Engineering (ASME) Heat Transfer Memorial Award and the 2005 ASME James Harry Potter Gold Medal. He has served as a consultant to several major research centers and corporations, including Los Alamos and Oak Ridge National Laboratories, Exxon Mobil, and Intel Corporation. He presently serves on the boards of directors of both publicly-traded and private companies. Dr. Faghri received his M.S. and Ph.D. degrees from the University of California at Berkeley, and a B.S. with highest honors from Oregon State University.