National Institute for Fuel cell Technology (NIFT)

presents

Seminar on

FUEL CELL STATUS AND RESEARCH NEEDS

By

Mark C. Williams
Adjunct Professor
West Virginia University

Abstract

The most difficult aspect of research is deciding on what researchers should work. Fuel cells and fuel cell turbine hybrids have basic electrochemical thermodynamic features which can assist in determining research directions. One can mathematically demonstrate that for any elemental direct anodic oxidation reaction for a simple hybrid system, any fuel cell, and any operating temperature, any pressure, the maximum reversible work is equal to the free energy of reaction at the standard state. This is useful in defining an intrinsic fuel cell exergetic efficiency. It is important to understand the maximum possible thermal efficiency a device is capable of obtaining and then what of this it actually achieves. One can develop an equation for thermal efficiency as a product of exergetic efficiency and possible thermal efficiency for loosely integrated fuel cell turbine hybrids. New opportunity fuels have increasing importance in all future energy scenarios. Ammonia and direct methanol give greater maximum intrinsic thermal efficiency than hydrogen oxidation. From simple thermodynamic studies one would conclude that the great payoff in terms of theoretical efficiency potential is for research is DCFC, PEFC, and direct oxidation of methane, intermediate temperature SOFC, and simple fuel cell heat engine hybrids.

Date: **03/06/08**
Time: **2:00 pm**
Place: **NRCCE Building, Room 125AB**