



Materials Advantage Student Night WSU-Dayton Joint Chapter Meeting

Friday, November – 3rd, 2006

**Fuel Cells for High Performance Military Applications:
A United States Air Force Perspective**

Speaker

Dr. Thomas L. Reitz,

Air Force Research Laboratory, Wright Patterson AFB, OH

Schedule:

5:30 p.m – Social

6:30 p.m – Dinner (free for students)

7.30 p.m – Program (presentation on student benefits and talk by Dr. Reitz)

Tentative Dinner Menu:

Grilled Salmon, Swiss Steak, Veggie Lasagna, Belgium Carrots, Country Green Beans, Fresh Herb Roasted Potatoes, Rice Pilaf & Mushrooms, Garden Salad, BBQ Meatballs, Rolls, Fruit Bowl and Brownies, Beverage.

Door prizes after dinner!

**Student Union – E156B
Wright State University
Dayton - OH**

Balakrishna Cherukuri
Wright State University
Dayton, Ohio

Overview presentation of Wright State University Student ASM Chapter and it's benefits to students.

Fuel Cells for High Performance Military Applications: A United States Air Force Perspective

Thomas L. Reitz

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Fuel cells are devices which electrochemically convert a fuel and an oxidant into electric current. They are different from batteries in that the fuel and oxidant are not contained internal within the electrode, but are stored externally where they are continuously fed into the fuel cell. Because reactants are fed in a continuous manner, the energy density of these devices can approach that of the fuel for extended missions. While fuel cells have shown promise as a means for increasing the efficiency and energy density of many applications, cost and reliability concerns currently restrict commercial viability. Many military applications are shorter lived, however, and the increased capabilities associated with these systems can offset the increased system costs. As the need for remote site and long endurance power within the military continues to increase, high efficiency power generation technologies will become increasingly important.

While there are many core technology issues related to fuel cells which are common in both commercial and military applications, high performance aspects associated with specific military platforms are specifically being addressed through military research and development. One such issue is the compatibility of fuel cells with military logistic fuel. Fuel cells, although capable of increased overall efficiencies as compared to conventional heat engines, require extremely pure fuel streams for operation. To address this requirement, the DoE has sought to institute both a comprehensive domestic hydrogen infrastructure and to enable large-scale processing of coal to electricity. Neither of these approaches will directly address the future energy needs of the military because of their requirement to operate anywhere and at anytime. As such fuel reformation of military logistic fuel represents the most likely near-term solution to facilitate proliferation of larger scale (>1 kW) fuel cell power generation within the Department of Defense.

The objective of this presentation will be to present the Air Force's perspective of fuel cell system development as it relates to various military ground and air applications. Examples of potential fuel cell technology transitions for small, intermediate and large-scale military power generation will be presented. Additionally, a brief discussion of the Air Force's approach of incorporating synthetic logistic fuels into existing military systems will be presented.

Dr. Thomas L. Reitz, Air Force Research Laboratory, Wright Patterson AFB, OH

Dr. Reitz obtained his Ph.D. in Chemical Engineering from Northwestern University in Evanston, Illinois in December 2000. His dissertation focused on catalyst design and characterization relating to fuel processing for low temperature fuel cell applications. During this time, he designed and constructed multiple experimental systems to characterize fuel processing in both steady state and transient environments. Dr. Reitz is currently employed at the Air Force Research Laboratory where he leads an interdisciplinary research group which investigates a multitude of fundamental and applied research technologies relating to fuel cell development. Dr. Reitz's internal research focuses on fundamental investigations of catalysts, electrode materials, and electrolytes which permit electrochemical conversion of complex fuels (JP's, Diesels, and alcohols) either directly or via their reformates. Dr. Reitz's extramural activities support the development of fuel cell power systems for military aerospace and small portable power applications.

Directions from I-675:

- 1. Take the N.Fairfield Exit and turn towards Nutter Center (Turn Right at the ramp if you are coming from the North and Left if you are coming from the South).**
- 2. Turn Left onto Colonel Glenn Hwy**
- 3. Turn Right at the second traffic light on to University Blvd**
- 4. Take the first Right which is a one way road (marked by a RED arrow in the picture).**

The visitor parking is on to your left as shown in the picture.

Visitors may have to pay \$4.00 for parking. It's still being negotiated.

