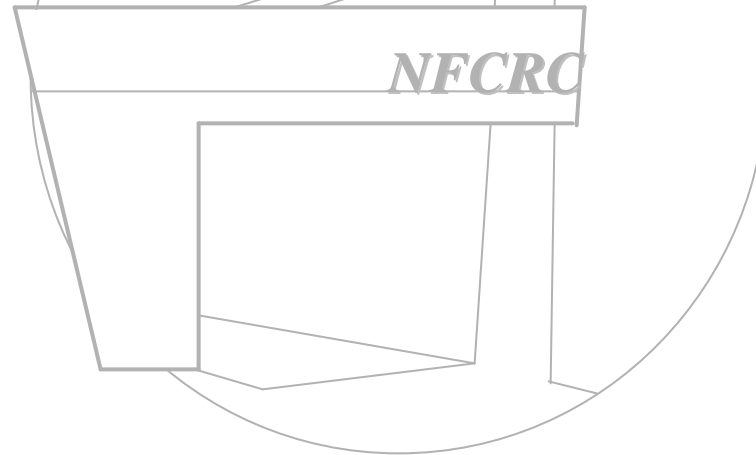


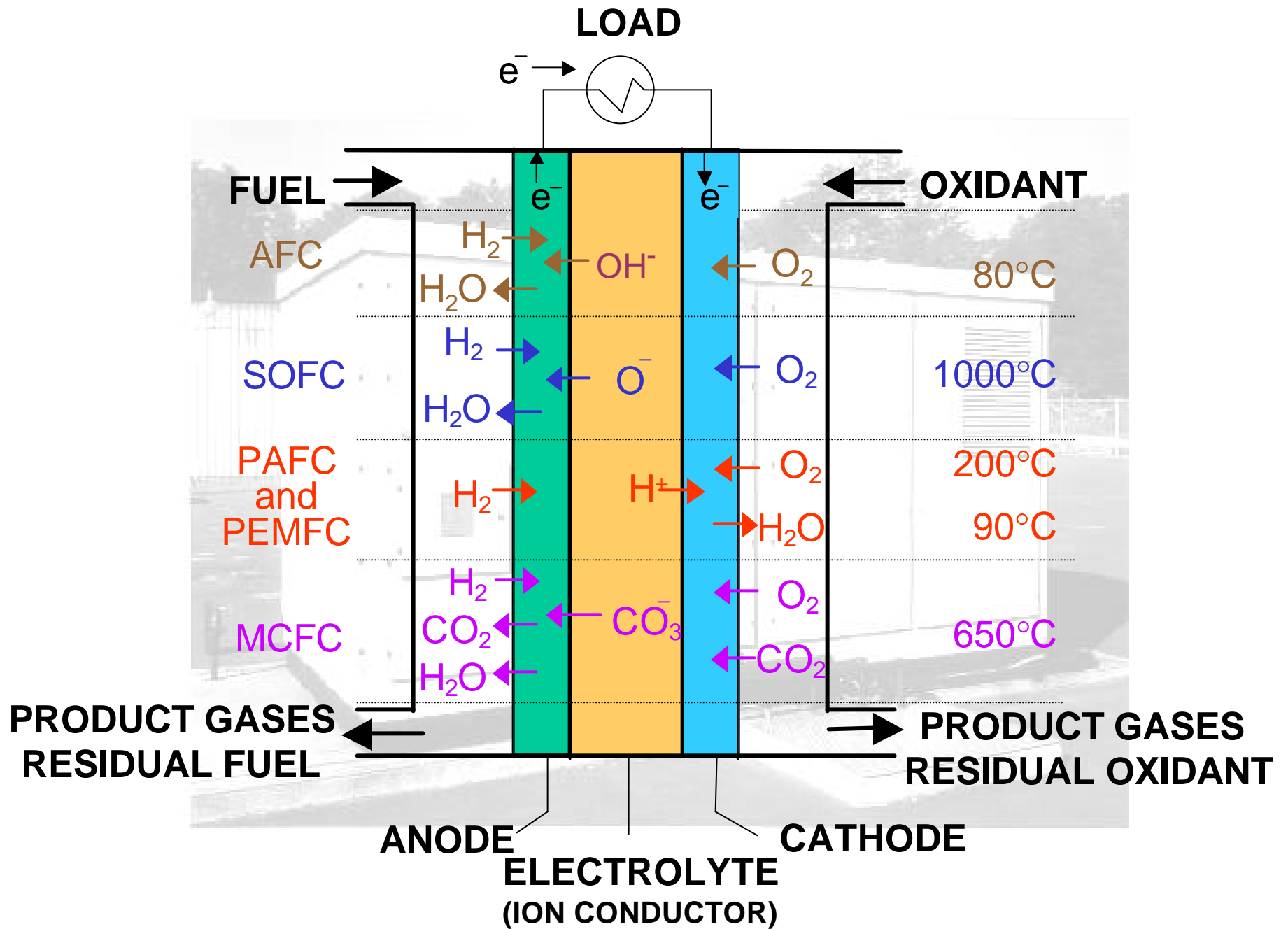
**UNIVERSITIES FOR FUEL CELLS
WORKSHOP
“CONTROLS”**



APRIL 3-4, 2002

NATIONAL FUEL CELL RESEARCH CENTER





CHARACTERISTICS

- **ACOUSTIC EMISSION (“VIRTUALLY ZERO”)**
 - HMMMMMMMM
- **POLLUTANT EMISSION**
 - ULTRA LOW (“VIRTUALLY ZERO”)
 - TENTHS PPM NO_x
- **ELECTRIC EFFICIENCY**
 - A MAJOR ATTRIBUTE
 - 30-100% HIGHER THAN SIMILAR SIZE COMBUSTION ENGINES
- **RELIABILITY and MAINTAINABILITY**
 - POTENTIALLY HIGH
 - NO MOVING PARTS

CURRENT STATUS

- **EMERGING INTO THE MARKET**
 - DEREGULATION
 - ENVIRONMENTAL PRESSURES
 - CALIFORNIA STATIONARY FUEL CELL COLLABORATIVE
- **INVENTED IN 1839**
- **LITTLE UNIVERSITY RESEARCH TO DATE**
- **MAJOR MARKET HURDLES**
- **MAJOR TECHNOLOGY HURDLES**
- **LARGE EDUCATED WORKFORCE NEEDED**
- **FERTILE GROUND FOR UNIVERSITY RESEARCH**

REMARKABLE

“UNIVERSITIES FOR FUEL CELLS”

- **NFCRC OUTREACH INITIATIVE**
- **SUPPORTED BY DOE, DOD**
- **APPROACH**

1) COMMUNICATION

- **IDENTIFY SIX FUEL CELL “COMPONENT” AREAS**

***MATERIALS, POWER ELECTRONICS, CONTROLS,
FUEL REFORMATION, INFORMATION TECHNOLOGY,
SYSTEMS ANALYSES***

- **FORM UNIVERSITY GROUP AROUND EACH AREA**
- **HOST ANNUAL WORKSHOP FOR EACH AREA**
- **INTERFACE TO FUNDING AGENCIES**
- **INPUT TO AGENCY PROGRAM PLANNING**

2) VISIBILITY

- **WEB LINKS**

“CONTROLS FOR FUEL CELLS” WORKSHOP

- **THURSDAY**

- **BACKGROUND**

- **PRESENTATIONS FROM UNIVERSITY PARTICIPANTS**

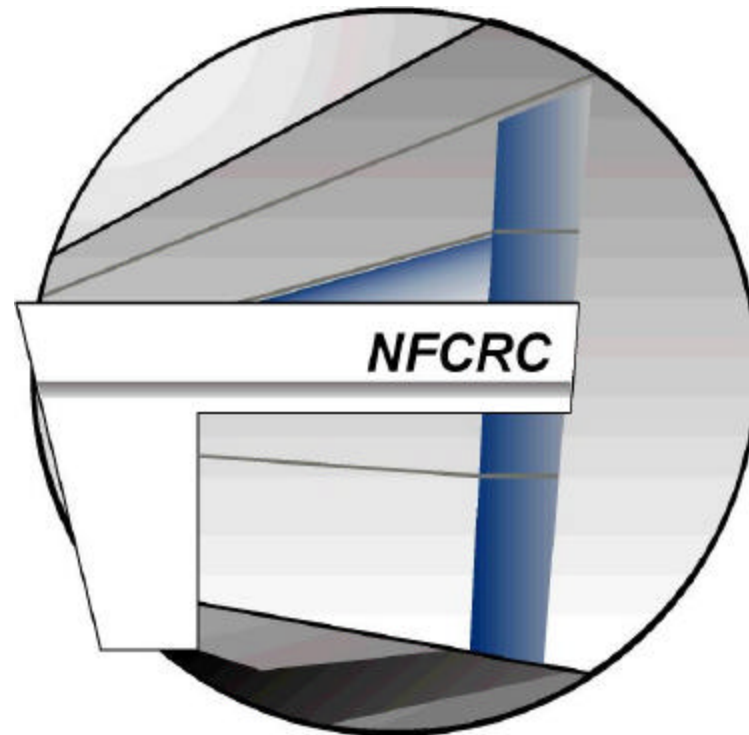
- **GOVERNMENT PRESENTATIONS**

- **FRIDAY**

- **BREAK-OUT SESSIONS**

- **MISSION, FUTURE ACTIVITIES,.....**

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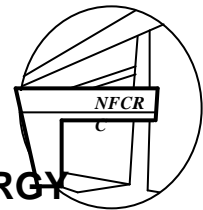
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<http://www.nfcrc.uci.edu>**

“HYBRID”



**“MOST EXCITING DEMONSTRATION OF ADVANCED
ELECTRIC GENERATION TECHNOLOGY OF THIS
DECADE”**

U.S. DEPARTMENT OF ENERGY



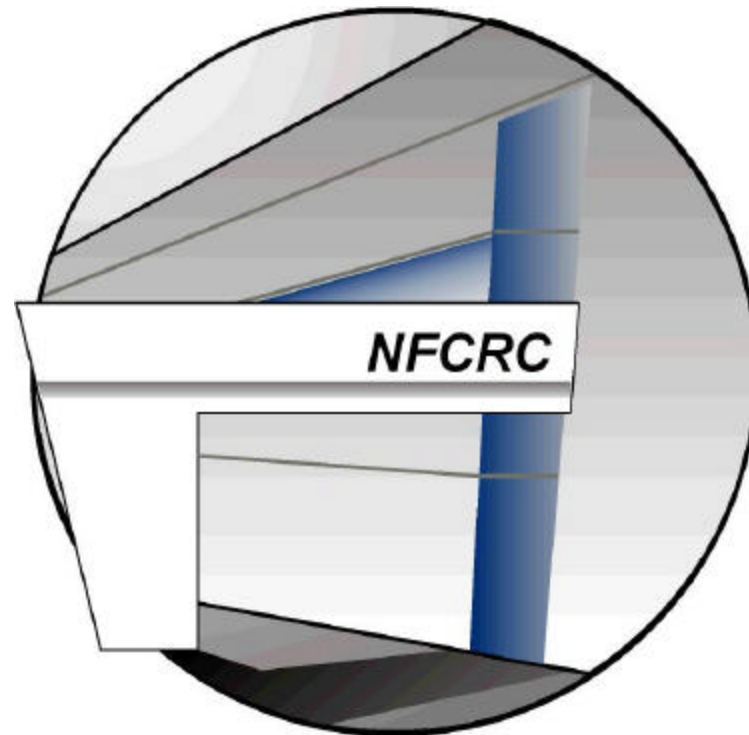
- **DECEMBER 24, 2002**



- **MR. GREGG KELLY**
PRESIDENT AND CEO
ORTHODYNE ELECTRONICS



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