# 2005 Annual DOE Hydrogen Program Review

# *Hydrogen Production Using Nuclear Energy*

**A. David Henderson**

**Office of Nuclear Energy, Science & Technology**

**Project ID # PD36**

# Outline

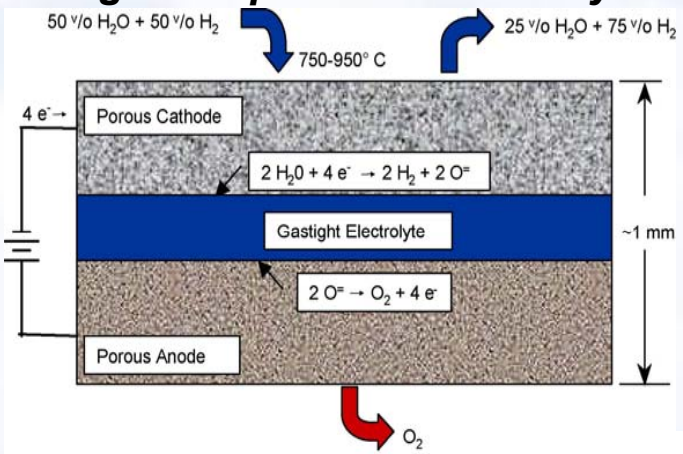
- Barriers
- Nuclear Technologies
- Program Organization/Coordination
- 2004 Technical Accomplishments
- Future Plans

# Barriers

- Long-Term – Cost
  - Nuclear reactor & central hydrogen production facility
  - Distribution from central production to point of use
- Near-Term
  - Materials – high-temperature, corrosion resistant
  - Catalysts – high-temperature, high-activity, stable
  - Process realization – achieving reasonable performance of small-scale experiments

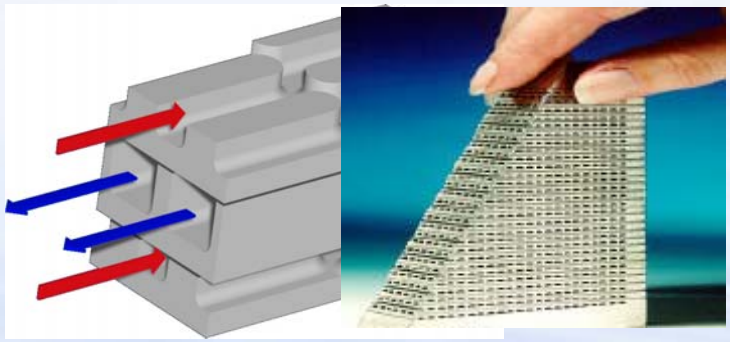
# Nuclear Technologies

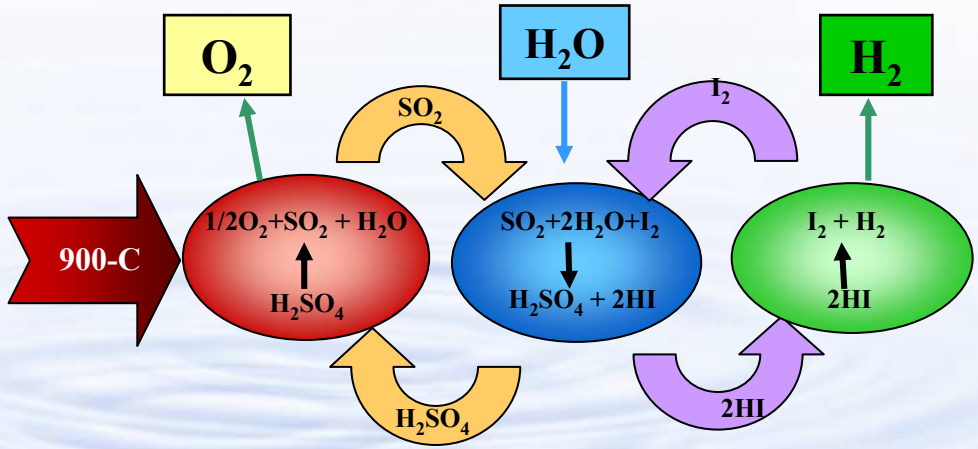
***High Temperature Electrolysis***




- Thermochemical Cycles *(Scaling, efficiency)*
- High Temperature Electrolysis *(modular scaling, efficiency)*
- System Interface *(High temp materials and HX design*

***Interface Technologies (HX, Materials)***






***Thermochemical Cycles***

# Program Organization/Coordination

Office of Nuclear Energy, Science & Technology
Bill Magwood, NE-1

Principal Deputy Director
Shane Johnson, NE-1.2 (Acting)

Office of Technology
Shane Johnson, NE-2.4

Office of Advanced Nuclear Research
John Gross, NE-20 (Acting)

AFCI – Advanced Fuel Cycle Initiative
Gen IV – Generation IV Nuclear Energy Systems Initiative
NHI – Nuclear Hydrogen Initiative
I-NERI – International Nuclear Energy Research Initiative

AFCI
Buzz Savage
Program director

Generation IV
Rob Versluis
Acting Program Director

NHI
David Henderson
Program Manager

I-NERI / NERI
Suibel Schuppner (NE-20)

Technical Integration
John Kelly (SNL)

Technical Integration
David Ostby (INL)

Technical Integration
Paul Pickard (SNL)

Systems Analysis, Kathy McCarthy (INL)

Fuel / Clad
Kemal Pasamehme -toglu (INL)

Separations
Jim Laidler (ANL)

Transmutation
Mike Cappiello (LANL)

Design & Eval. Methods
Hussein Khalil (ANL)

Materials
Bill Corwin (ORNL)

Energy Conversion
Paul Pickard (SNL)

Systems Interface
Steve Sherman (INL)

High-Temp. Electrolysis
Steve Herring (INL)

Thermo-Chemical
John Kolts (INL)

LWR / ALWR

VHTR: Phil MacDonald (INL)

SCWR: Mike Modro (INL)

GFR: Kevan Weaver (INL)

LFR: Doug Crawford (INL) & Bill Halsey (LLNL)

SFR: Bob Hill (ANL)

MSR: Charles Forsberg (ORNL)

# Accomplishments & Plans

- 2004 Technical Accomplishments
  - Completed designs for laboratory-scale experiment systems
  - Completed button-cell experiments on candidate electrolyte materials for high-temperature electrolysis
  - Enveloped infrastructure and balance-of-plant requirements for thermochemical and high-temperature electrolysis pilot-scale experiments
  - Defined system interface technical requirements
  - Initiated high-temperature materials & heat exchanger development work

# Future Plans