**Catalytic Generation**

**Program:** Enhanced Selectivity of Steam Reforming Catalysts  
**Sponsor:** U.S. Army  
**Accomplishments:**  
1) Steam-reforming catalysts prepared using co-precipitation to minimize coking, sintering and CO formation  
2) Developed methanol steam-reforming reactor CuO/ZnO/Al2O3 catalyst  
**PI:** S Suib

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**Gas Analysis Technology**

**Program:** Creation of Scalable, Cartridge-Based Microreactor Reformers  
**Sponsor:** ONR  
**Goal:** Develop a reformer that integrates several elements within one design and has controllable heat and mass transfer  
**PI:** B Wilhite  
**Flow Diagram:**

- Fuel/Water
- Steam Reforming
- Mass Transfer
- To Fuel Cell
- Vent
- Effluent
- Burn-Off Cool-down

**Accomplishments:**  
1) Developed inline tool to measure H2 concentration in process gas streams  
**PI:** X Huang

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**Program:** Ammonia Borane Pyrolysis Chemistry  
**Sponsor:** Ensign Bickford & U.S. Army  
**Accomplishments:**  
1) Characterized thermal decomposition of ammonia borane to produce high density H2 source  
2) Created thermal models of the reactor to better understand the reaction process  
**PI:** T Molter, U Pasaogullari, B Wilhite, S Suib

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**Program:** Electrochemical Hydrogen Separator  
**Sponsor:** FuelCell Energy & CT Clean Energy Fund  
**Accomplishments:**  
1) Separated 1200 Liters/Hr of H2 from process gas  
2) > 6000 hours of reliable operation  
**PI:** T Molter

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**Program:** Environmental Analysis of Manure Digester Biogas powered Fuel Cells  
**Sponsor:** EPA  
**Accomplishments:**  
Design, fabrication and operation of SOFC cells running on methane-rich fuel  
**PI:** N Sammes, J Pusz

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**Chemical Generation**

**Program:** Mixed Conducting Ceramic Membranes for Hydrogen Separation  
**Sponsor:** CeraMem Inc.  
**Accomplishments:**  
1) Sol-gel Pechini methods used to synthesize Strontium, Barium Cerates and Zirconates  
2) Samples tested for: morphology, microstructure, stability and electrical conductivity  
**PI:** A Smirnova

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**Biological Generation**

**Program:** Reformers Gas Analysis  
**Sponsor:** Precision Combustion, Inc.  
**Accomplishments:**  
**PI:** N Sammes, J Pusz

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**Separation Technology**

**Program:** Enhanced Selectivity of Steam Reforming Catalysts  
**Sponsor:** U.S. Army  
**Accomplishments:**  
1) Steam-reforming catalysts prepared using co-precipitation to minimize coking, sintering and CO formation  
2) Developed methanol steam-reforming reactor CuO/ZnO/Al2O3 catalyst  
**PI:** S Suib