



# NETL-RUA: Combining Capability and Expertise to Serve as an Engine for Innovation

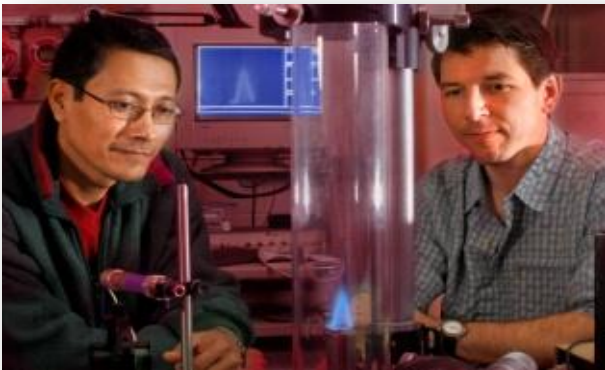
Cynthia A. Powell

Director – NETL's Office of Research & Development

# NETL's Office of Research & Development

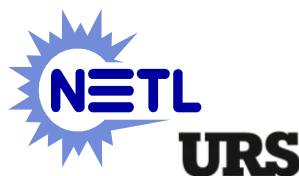
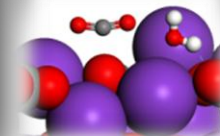
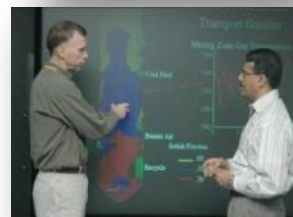
*DOE's Fossil Energy National Laboratory*

- **National Resource for Technology Innovation and Validation in Support of the DOE Fossil Energy Mission.**
- **Leveraging Strategic Partnerships to Speed Energy Technology Discovery, Development & Deployment.**
- **Facilitating the Education of the Energy Leaders for Tomorrow.**



# NETL's Office of Research & Development

- **History:**
  - A National Energy R&D Resource since 1910
- **People:**
  - 430 Federal & Contractor R&D Staff at three Sites
- **University Collaborations:**
  - NETL Regional University Alliance: CMU, Penn State, Pitt, Virginia Tech, and WVU
- **National Collaborations:**
  - Carbon Capture Simulation Initiative
  - National Risk Assessment Partnership
  - CRADAs with Industrial Partners
- **Relevance:**
  - Twelve R&D 100 Awards in last 5 years
  - Eight National FLC Excellence in Technology Transfer Awards in last 5 years
  - Multiple Publications in High Impact Journals
- **Leverage:**
  - DOE, DOI, DOD, States



# Energy Research Expertise

## Core Competencies and Capabilities to enable R&D in support of the Department of Energy mission for Sustainable Domestic Energy Security:

- Validated Simulation-Based Science & Engineering to Accelerate Energy Technology Development.
- Materials Discovery, Characterization, Development & Deployment, to Enable the Nation's Energy Future.
- Development & Optimization of Engineered Systems to Enable the Sustainable Production & Utilization of the Nation's Fossil Fuel Resources:
  - Efficient Energy Production.
  - CO<sub>2</sub> Storage/Utilization.
  - Access to Unconventional Resources.





# Delivering market access and professional and technical services as part of the NETL-RUA



## Services

- Planning
- Engineering
- Architectural Design
- Program and Construction Management
- Procurement
- Construction
- Contracting
- Facilities Start-up and Management
- Operations and Maintenance
- Decommissioning and Closure
- Specialty Construction Services
- Installations Management
- Logistics Management
- Environmental Assessment and Remediation
- Hazardous and Nuclear Waste Management
- Systems Engineering
- Technical Assistance

## Rankings

- #267 on the FORTUNE 500 list
- #2 on Engineering News-Record's (ENR) list of the Top 500 Design Firms
- #4 on Building Design & Construction's Giants 300 list of Engineer/Architects
- #33 on Building Design & Construction's Giants 300 list of Construction Managers
- #23 on ENR's list of the Top 400 Contractors
- #2 on ENR's list of the Top 200 Environmental Firms
- #2 on ENR's list of the Top 150 Global Design Firms
- #13 on ENR's list of the Top 100 Design-Build Firms
- #22 on Defense News' list of the Top 100 Defense Contractors
- Named to list of America's Safest Companies by Occupational Hazards magazine

URS has 46,000 employees severing Federal, Infrastructure, Industrial, Commercial, Oil, Gas and Power markets from offices across 40 countries in America, Europe, Middle East and Asia.

URS clients include US federal, state and local governments; global government agencies and Private corporations including 50% of the Fortune 500 companies world wide.



## Gross Revenues

FY 2011 Revenues: \$9.55 billion

New York Stock Exchange Symbol

URS

Corporate Headquarters

600 Montgomery Street, 26th Floor

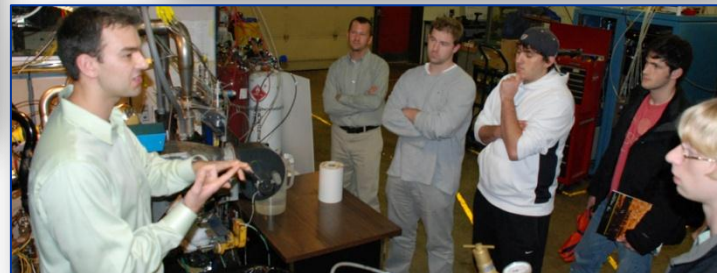
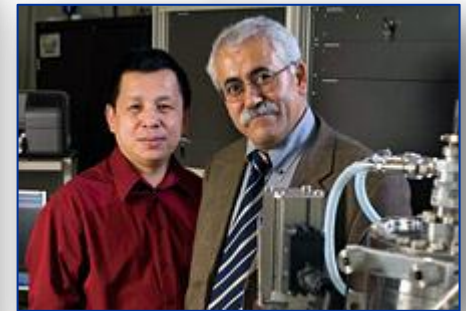
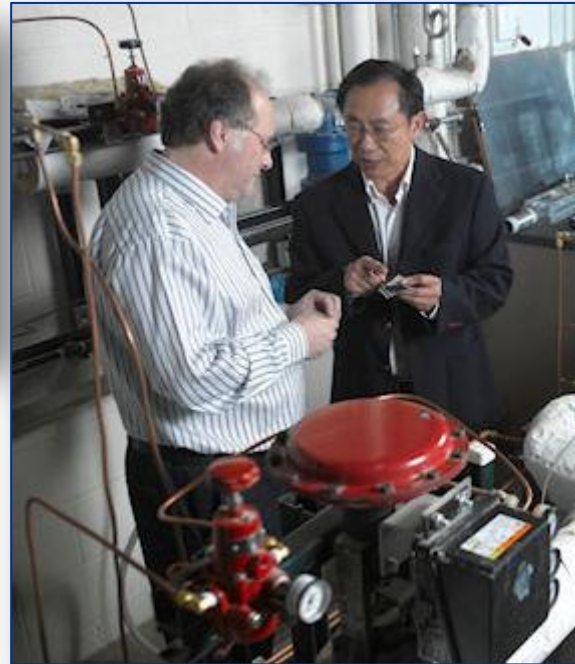
San Francisco, CA 94111-2728

Tel: 415.774.2700 Fax: 415.398.1905

# Five Nationally-Recognized Universities



University of Pittsburgh



# NETL-RUA Philosophy

Partnership and collaboration to create and enable the *right* Research Teams to do the *right* research that effectively meets emerging National need for science and technology.



*Shared  
Resources*



*Shared  
Intellect*



*Technology  
Innovation*



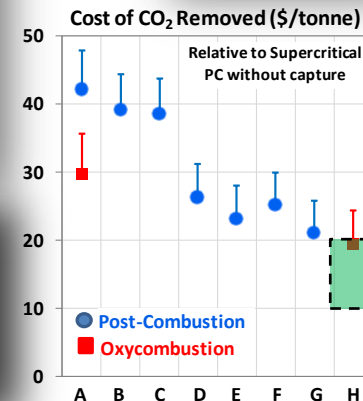
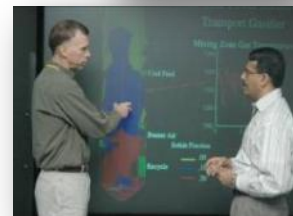
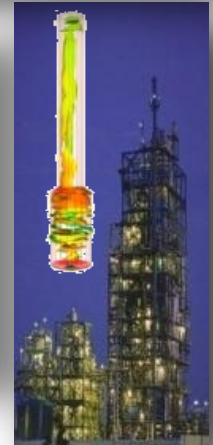
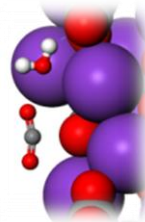
# Primary Research Focus: Making Fossil Energy an Affordable, Sustainable Domestic Resource

- **Reducing Environmental Impact**

- Increased Efficiencies
- Affordable Carbon Capture
- CO<sub>2</sub> Utilization
- CO<sub>2</sub> Storage with 99% Permanence

- **Unconventional Fossil Fuel Resources**

- Shale Gas
- Ultra-deep Resources
- Methane Hydrates



Advanced Power Systems Enable CCUS Opportunities



# An R&D Alliance for Energy Innovation

## ***Innovative Research***

*Transitioning from current fuel sources to sustainable energy systems of the future*



## ***Accelerated Technology Commercialization***

*Integrating computational modeling, innovative bench-scale research, and large-scale system design and testing to reduce risk and speed market entry*



## ***Unparalleled Access to Collaborators***

*National laboratory and university researchers partner with relevant industries to identify new energy technology, develop it, and integrate it into commercial solutions*



*Students working side by side in the lab with preeminent energy researchers producing the talent for future enterprises*

## ***Springboard for Education***



# Examples of NETL-RUA Research Success

## Carbon Capture Simulation Initiative

- *developing the modeling and simulation tools to inform & accelerate technology deployment*

## National Risk Assessment Partnership

- *developing the science base to define and quantify the long-term risks associated with carbon sequestration*

## Carbon Capture Materials

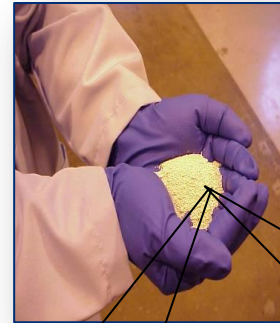
- *R&D 100 Award winning sorbent materials*

## CO<sub>2</sub> Utilization

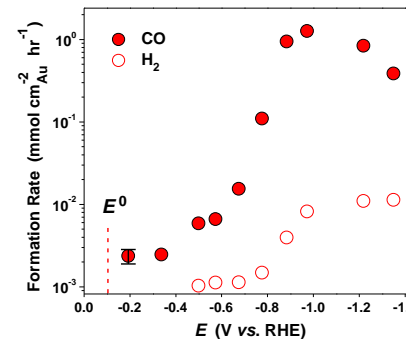
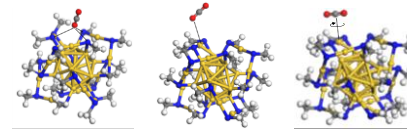
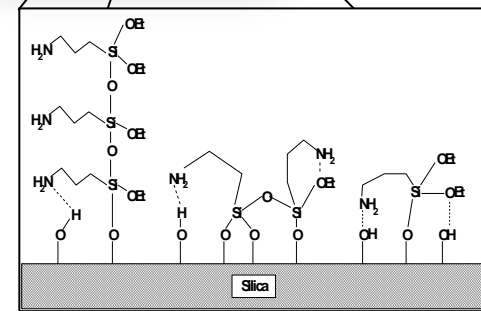
- *unique catalyst provides unprecedented catalytic conversion efficiencies for CO<sub>2</sub> → CO*

## Shale Energy Research Alliance

- *enabling the responsible, sustainable discovery and production of our domestic energy resources*



**CCSI**  
Carbon Capture Simulation Initiative



**nrap**  
National Risk  
Assessment Partnership



# Transferring NETL-RUA Technology to the Market Place

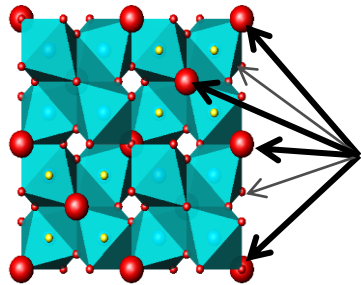
## High Performance Refractory Material for Slagging Gasifiers

- Licensed to Harbison-Walker Refractories Company, AUREX™ 95P is the most significant improvement in gasifier refractories in over 25 years. It is now the material of choice for high-wear areas of advanced, high-temperature gasifiers.
- Federal Laboratory Consortium Regional Award Winner for Technology Transfer



# Transferring NETL-RUA Technology to the Market Place: Fuel Reforming Catalysts

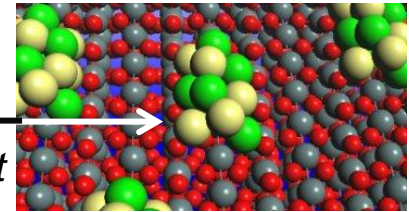
## Pyrochem Catalyst



*Individual surface atoms in the Pyrochlore catalyst impart unique properties*

## Conventional Catalyst

*A conventional catalyst is formed with metal clusters sitting on a support surface*



## Advantages:

- Long term activity for diesel reforming with excellent resistance to sulfur poisoning (fuel cell applications)
- Extraordinary activity for natural gas reforming to hydrogen (refining applications)

Technology has been licensed to local start-up Pyrochem Catalyst Corporation for further development for commercial applications.



**NEXTECH**

**DELPHI**



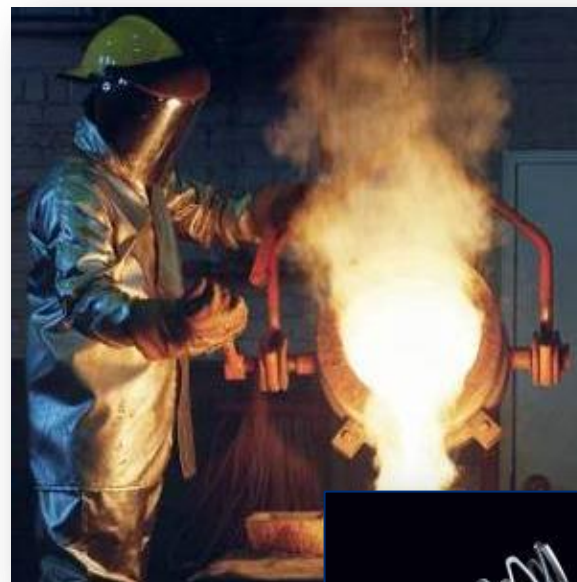


**Boston Scientific**  
*Defining tomorrow, today.™*

# Leveraging NETL-RUA Capabilities through Work For Others

## Platinum/ Chromium Alloy for Coronary Stents (2011 R&D 100 award and 2012 DOE Secretary's Honor Award)

Jointly developed by NETL and Boston Scientific, this novel alloy is the first austenitic stainless steel formulation to be produced for the coronary stent industry having high visibility with x-ray scanning, while being flexible enough to navigate through arteries.



# 2ND ENERGY

Keith Crane, Director of Environment, Energy, and Economic Development Program – RAND Corporation				
10:00 a.m. – 10:30 a.m.	SESSION 1 Preview “NETL-RUA: Combining Capability and Expertise to Serve as an Engine for Innovation” Cindy Powell, Director – U.S. DOE/NETL Office of Research and Development			
10:30 a.m. – 10:45 a.m.	Break and Networking			
10:45 a.m. – 12:30 p.m.	SESSION 1: NETL-RUA Research & Development Overview of capabilities and cutting-edge research from U.S. DOE/NETL and its Regional University Alliance			
	<table border="1"> <tr> <td> <b>TRACK 1A:</b> Oil &amp; Gas Production &amp; Utilization           <ul style="list-style-type: none"> <li>Monitoring Natural Systems</li> <li>Well Bores &amp; Drilling</li> <li>Advanced Simulation Tools for Reservoir Performance</li> <li>Partnering for Innovation: Shale Gas Initiative</li> </ul> </td> <td> <b>TRACK 1B:</b> Materials Design &amp; Development           <ul style="list-style-type: none"> <li>Advanced Alloy Fabrication</li> <li>Soft Materials</li> <li>Catalyst Development &amp; Commercialization</li> <li>Combinatorial Approaches to Material Optimization</li> <li>Partnering for Innovation: Critical Materials</li> </ul> </td> <td> <b>TRACK 1C:</b> Process Design, Integration &amp; Optimization           <ul style="list-style-type: none"> <li>Simulation-based Engineering</li> <li>Application of Optimization to Industrial Problems</li> <li>Partnering for Innovation: Air Emissions</li> <li>Partnering for Innovation: Power Electronics for Smart Grid</li> </ul> </td> </tr> </table>	<b>TRACK 1A:</b> Oil & Gas Production & Utilization <ul style="list-style-type: none"> <li>Monitoring Natural Systems</li> <li>Well Bores &amp; Drilling</li> <li>Advanced Simulation Tools for Reservoir Performance</li> <li>Partnering for Innovation: Shale Gas Initiative</li> </ul>	<b>TRACK 1B:</b> Materials Design & Development <ul style="list-style-type: none"> <li>Advanced Alloy Fabrication</li> <li>Soft Materials</li> <li>Catalyst Development &amp; Commercialization</li> <li>Combinatorial Approaches to Material Optimization</li> <li>Partnering for Innovation: Critical Materials</li> </ul>	<b>TRACK 1C:</b> Process Design, Integration & Optimization <ul style="list-style-type: none"> <li>Simulation-based Engineering</li> <li>Application of Optimization to Industrial Problems</li> <li>Partnering for Innovation: Air Emissions</li> <li>Partnering for Innovation: Power Electronics for Smart Grid</li> </ul>
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Lunch				
12:30 p.m. – 2:00 p.m.	Lunch Address: “Encouraging Growth in the Region’s Manufacturing Sector: Results of the Governor’s Manufacturing Advisory Council (GMAC) 2012 Report” C. Alan Walker, Co-Chair, Secretary – PA Department of Community & Economic Development			
2:00 p.m. – 3:30 p.m.	SESSION 2: Business Processes & Best Practices ‘How-to’ informative presentations from the experts on innovation and technology commercialization best practices and processes			
	<table border="1"> <tr> <td> <b>TRACK 2A:</b> Open Innovation Learn the how to’s and benefits of big and small companies partnering through Open Innovation           </td> <td> <b>TRACK 2B:</b> Product Development &amp; Intellectual Property Learn about protecting your intellectual property and the latest best practices in new product development           </td> </tr> </table>	<b>TRACK 2A:</b> Open Innovation Learn the how to’s and benefits of big and small companies partnering through Open Innovation	<b>TRACK 2B:</b> Product Development & Intellectual Property Learn about protecting your intellectual property and the latest best practices in new product development	
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Networking Reception A showcase of current NETL-RUA research and technology; as well as overviews of business resources around innovation commercialization				
3:30 p.m. – 5:00 p.m.				



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