Penn State is leading a University Coalition for Fossil Energy Research (UCFER) that will advance basic and applied research for clean and low-carbon energy based on fossil fuels in support of the U.S. Department of Energy’s mission. UCFER is focusing on research that will improve the efficiency of production and use of fossil energy resources, while minimizing the environmental impacts and reducing greenhouse gas emissions.

Through a nationwide open competition, the six-year, $20 million dollar project was awarded by the Department of Energy’s National Energy Technology Laboratory. Penn State, along with the Massachusetts Institute of Technology, Princeton University, Texas A&M University, University of Kentucky, University of Southern California, University of Tulsa, University of Wyoming and Virginia Polytechnic and State University, are the founding members of the coalition. Dr. Chunshan Song, director of Penn State’s Energy Institute in the College of Earth and Mineral Science and distinguished professor of fuel science and chemical engineering, is the principal investigator and director of UCFER.

The University Coalition for Fossil Energy Research has been established to advance basic and applied fossil energy research through mechanisms that promote collaboration among the Department of Energy and the universities that are members of the Coalition by the coordination of research and the sharing of data. Its collaborative research focuses on coal, natural gas, and oil and the research involves one or more of the following five core competencies:

- **Geological and Environmental Systems**, consisting of research on geomaterials, fluid flow in geologic media, and geospatial analyses.
- **Materials Engineering and Manufacturing**, consisting of research on the design, development, and deployment of advanced functional and structural materials for use in extreme service environments.
- **Energy Conversion Engineering**, consisting of the evaluation, integration, control and performance modeling of processes and components for developing innovative energy conversion processes and transformational technologies.
- **Systems Engineering and Analysis**, consisting of analysis and design of advanced energy systems such as power plants, energy markets, and energy-environment interactions.
- **Computational Science and Engineering**, consisting of research involving high-performance computing and data analytics that enable the generation of information and insights through the integration of experimental data and engineering analyses.

**UCFER Inaugural Request for Proposals – RFP 2016-01**

A total of 25 proposals were received and reviewed by the UCFER Technical Advisory Committee and its Executive Council. Funding available for this round of proposals was $1.925 million and the total funding requested was $7.66 million.

Six projects were selected for funding:
- **Converting CO2 and Methane to Fuels by Enhanced Plasmonic Effects** in a Nanotemplated Catalyst Plasma Project Reactor
- **Efficient Reduction of CO2 in a Bipolar Electrochemical Cell**
- **A Low-Cost Technique for In-Situ Stresses and Geomechanical Properties Measurement Based on Leak-Off Tests and Caliper Logs**
- **A Novel Point Process Filtering Paradigm for Modeling and Inversion of Microseismic Monitoring Data During CO2 Storage**
- **Integration of Geophysical and Geomechanical Modeling to Monitor Integrity of Carbon Storage**
- **Grid Independence and Uncertainty Quantification in Gas-Solid Flow Simulations**

**UCFER Second Round of Solicitations – RFP 2016-02**

A total of 39 proposals were received and reviewed by the UCFER Technical Advisory Committee, Core Competency Advisory Board, external reviewers, and Executive Council. Funding available for this round of proposals was $2.08 million and the total funding requested was $8.16 million.

Five projects were selected for funding:
- **Designing Polymer/2D MOF Composite Membranes with Enhanced CO2 Transport for CO2/N2 Separation**
- **Layer-by-Layer Functional Thin Film Coatings for Enhanced Light Gas Separations**
- **Validation of CFD Models for Turbulent, Supercritical CO2 Combustion**
- **Experimental studies on the reaction mechanisms of oxygen carriers for CLC/CLOU of solid fuels**
- **Evaluation of Agglomeration Potential of Oxygen Carriers for Chemical Looping Combustion (CLC) and Chemical Looping with Oxygen Uncoupling (CLOU)**

**Founding Members**

- Penn State
- Massachusetts Institute of Technology
- Princeton University
- Texas A&M University
- University of Kentucky
- University of Southern California
- University of Tulsa
- University of Wyoming
- Virginia Polytechnic and State University

**2017 Members**

- University of Pittsburgh
- Louisiana State University
- The University of Utah
- West Virginia University
- Virginia Tech
- The Ohio State University
- University of Maryland
- University of Texas
- University of Pennsylvania

**UCFER Organization**

[Diagram of UCFER organization structure]

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[Memberships and affiliations list]