An Industrial-Based Consortium to Develop Premium Carbon Products from Coal

Annual Technical Progress Report
for the period
October 1, 2003 through September 30, 2004

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March 2006

Work Performed Under Cooperative Agreement No. DE-FC26-03NT41874

Submitted by:

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Abstract

Since 1998, The Pennsylvania State University (PSU) has been successfully operating the Consortium for Premium Carbon Products from Coal (CPCPC), which is a vehicle for industry-driven research on the promotion, development, and transfer of innovative technology on premium carbon products from coal to the U.S. industry. The CPCPC is an initiative being led by PSU, its co-charter member West Virginia University (WVU), and the U.S. Department of Energy's (DOE) National Energy Technology Laboratory (NETL), who also provides the base funding for the program, with PSU responsible for consortium management. CPCPC began in 1998 under DOE Cooperative Agreement No. DE-FC26-98FT40350. This agreement ended November 2004 but the CPCPC activity has continued under the present cooperative agreement, No. DE-FC26-03NT41874, which started October 1, 2003.

The objective of the second agreement is to continue the successful operation of the CPCPC. The CPCPC has enjoyed tremendous success with its organizational structure, that includes PSU and WVU as charter members, numerous industrial affiliate members, and strategic university affiliate members together with NETL, forming a vibrant and creative team for innovative research in the area of transforming coal to carbon products. The key aspect of CPCPC is its industry-led council that selects proposals submitted by CPCPC members to ensure CPCPC target areas have strong industrial support.

A second contract was executed with DOE NETL starting in October 2003 to continue the activities of CPCPC. An annual funding meeting was held in October 2003 and the council selected 10 projects for funding. Base funding for the projects is provided by NETL with matching funds from industry. Subcontracts were let from Penn State to the various subcontractors on March 1, 2004.

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Introduction

Since 1998, The Pennsylvania State University (PSU) has been successfully operating the Consortium for Premium Carbon Products from Coal (CPCPC), which is a vehicle for industry-driven research on the promotion, development, and transfer of innovative technology on premium carbon products from coal to the U.S. industry. The CPCPC is an initiative being led by PSU, its co-charter member West Virginia University (WVU), and the U.S. Department of Energy's (DOE) National Energy Technology Laboratory (NETL), who also provides the base funding for the program, with PSU responsible for consortium management. CPCPC began in 1998 under DOE Cooperative Agreement No. DE-FC26-98FT40350. This agreement ended November 2004 but the CPCPC activity has continued under the present cooperative agreement, No. DE-FC26-03NT41874, which started October 1, 2003.

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CPCPC is promoting the use of secure, domestic coal resources to produce environmentally benign, high-value carbon products, such as carbon fibers, activated carbons, binder pitches, cokes for baked anodes and graphite, carbon foams, and carbon nanotubes. Although coal is the largest domestic fossil fuel hydrocarbon resource of the U.S., estimated to last over 200 years at the present consumption rate, most of the premium carbon products developed and manufactured in the U.S. derive mainly from petroleum, thus creating dependence on foreign imports to manufacture essential carbon products for the domestic market. To ensure sustainable development of the carbon product, the inherent potential of the great abundance of coal in the U.S. must be pursued to supply and introduce environmentally benign and affordable premium carbon products to the general public. The CPCPC has, since 1998, strived for the recognition of coal as a valuable resource for producing premium carbon products. Several success stories have been funded so far including low-cost carbon fibers from coal for lighter vehicles, large production of inexpensive activated carbon for water and air treatment, and high-quality binder pitches and cokes from coal. Through its continuation, the industrial-driven consortium is committed to further promote projects that use coal to ensure a sustainable development of the U.S. carbon industry.

The scope of PSU's activities includes managing the process of attracting and maintaining consortium members, soliciting proposal, providing the forum for the CPCPC council in selecting proposals from members for technical work in the subject area, awarding and monitoring subcontracts to members to accomplish the selected technical work, and disseminating the results of the technical work via meetings of the consortium.

Executive Summary

Since 1998, The Pennsylvania State University (PSU) has been successfully operating the Consortium for Premium Carbon Products from Coal (CPCPC), which is a vehicle for industry-driven research on the promotion, development, and transfer of innovative technology on premium carbon produces from coal to the U.S. industry. The CPCPC is an initiative being led by PSU, its co-charter member West Virginia University (WVU), and the U.S. Department of Energy's (DOE) National Energy Technology Laboratory (NETL), who also provides the base funding for the program, with PSU responsible for consortium management. CPCPC began in 1998 under DOE Cooperative Agreement No. DE-FC26-98FT40350. This agreement ended November 2004 but the CPCPC activity has continued under the present cooperative agreement, No. DE-FC26-03NT41874, which started October 1, 2003.

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Experimental

No experimental work was performed. The project requires management activities from PSU.

Results and Discussion

During this budget period, an annual funding meeting was held at the Toftrees Resort and Four Star Golf Club in State College, Pennsylvania on October 29-30, 2003. Ten projects were selected by the council and subcontracts were let by PSU on March 1, 2004. The project funding periods are March 1, 2004 to February 28, 2005. The projects, principal investigators, and proposing organizations are:

“Coal-Derived Nanofiber Sheets,” Dr. David W. Firsich, Inorganic Specialists

“Anthracite Coal as a Feedstock for Activated Carbon,” Dr. John W. Zondlo, West Virginia University

“Understanding Anthracite Properties towards its use as Intumescent Material for Polyurethane Foams,” Dr. Caroline Burgess Clifford, The Pennsylvania State University and Air Products

“Coal-Based Mesophase Pitch for Carbon Products,” Dr. Doug J. Miller, Graf Tech International, Ltd

“Technical and Economic Assessment of Mild Coal Extraction,” Dr. Rodney Andrews, University of Kentucky

“Accelerated Processing of Isotropic Carbon Fibers from Coal,” Dr. Rodney Andrews, University of Kentucky

“Correlation of Foaming Performance with the Properties of Coal-Based Precursor,” Dr. Alfred H. Stiller, West Virginia University

“Nanostructured Anthracite-Metal Composites for Hydrogen Storage,” Dr. Angela Lueking, The Pennsylvania State University

“Use of Combustion and Gasification Chars for Mercury Capture: Correlation of Char Properties and Mercury Uptake Capacities,” Mr. Bruce G. Miller, The Pennsylvania State University and Southern Company

“Powdered Activated Carbon Recycling for Mercury Emissions Control,” Dr. David W. Mazyck, University of Florida

A tutorial was held on May 18-19, 2004 at the Hershey Lodge in Hershey, Pennsylvania. The theme for the tutorial was nano-technology and carbon science.

In addition, five workshops and conferences were attended to recruit members. The meetings attended were:

Conference/Workshop	Date	Location
DOE Workshop	March 3-5, 2004	Gaithersburg, MD
American Chemical Society Conference	March 27-April 2, 2004	Anaheim, CA
29 th International Technical Conference on Coal Utilization & Fuel Systems	April 18-22, 2004	Clearwater, FL
Carbon 2004	July 9-17, 2004	Providence, RI
American Chemical Society Conference	August 21-27, 2004	Philadelphia, PA

Conclusions

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References

None.