

# PROJECT FACTS

UNIVERSITY OF KENTUCKY CENTER FOR APPLIED ENERGY RESEARCH

## CARBON MATERIALS

### Production of Coal-Derived Pitch Feedstocks for Value-added Products.

The program is directed toward the development of technologies for producing coal-derived feedstocks for the production of a range of high value carbon materials and specialty chemicals. The program has successfully demonstrated that a broad range of value-added carbon materials such as carbon fibers, activated carbon fibers, binder pitches, and carbon/carbon composites can be produced from coal utilizing mild, non-hydrogenative solvent extraction.

Coal tar pitch, a liquid by-product from coke oven operations is a feed-stock for manufacturing a wide range of carbon materials such as anode binders, coke, graphite and different types of carbon fiber. However, the amount of pitch and other coal liquids available from this source is essentially determined by the demand for metallurgical coke, which has decreased due to a decline in the demand for steel and technological improvements in steel making. Furthermore, coke oven operations continue to close due to their failure to meet increasingly stringent environmental regulations and the necessary capital to rebuild and maintain existing coke ovens.

CAER sought to address these issues by developing a low severity, non-hydrogenative solvent extraction process to produce coal-derived pitches. This pitch material has been used to produce general purpose carbon fibers, activated carbon fibers and binder pitches. In all cases the materials produced were found to be comparable in terms of performance with those commercially available.

In continuing the development of the low severity, non-hydrogenative solvent extraction process, a new process concept has been developed: an integrated solvent extraction process. This integrated process, designed to minimize processing and solvent costs, will produce high value chemicals, carbon products and fuel. Extraction processes currently under development suffer from solvent depletion due to adduction, thermal cracking or chemical reaction with the feed coal. As a result, these processes require a significant amount of expensive solvent makeup and/or solvent treatment. The integrated extraction process solves this problem by generating its own indigenous, coal-derived solvent, while simultaneously producing high-value chemicals, such as phenols and cresols. The coal-derived solvent is then used to produce pitches under mild temperature and pressure conditions. These pitches are suitable feedstocks for low cost carbon fibers and binders used in the manufacture of carbon electrodes.

Conceptually, the integrated extraction process could be part of a larger co-production power plant where the solid and gas by-products of the integrated extraction process would be utilized as fuel for the power generation unit.

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