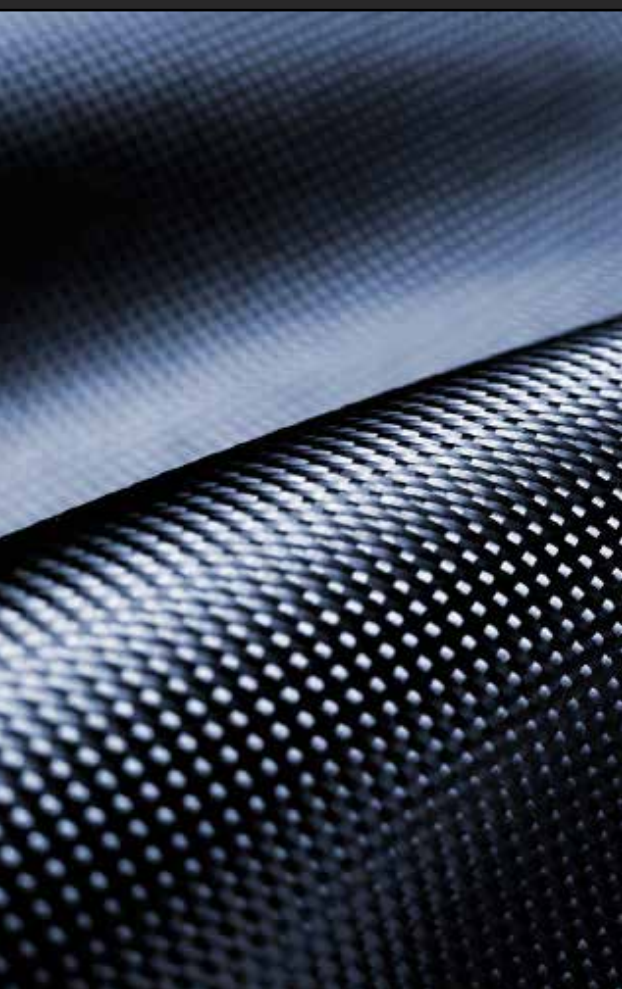


# RAMACO RESEARCH RODEO

---



THE LEADING EDGE IN  
COAL-TO-PRODUCTS  
RESEARCH

July 11,  
2018

July 12,  
2018



## 00

CONTENTS

01-02: Opening Section

03-06: Schedules

07-08: Session One – Understanding Coal

09-10: Session Two – Emerging Carbon Materials &amp; Products

11-12: Session Three – Marketable Carbon Products and Manufacturing Technologies Pt. 1

13-14: Session Four – Marketable Carbon Products and Manufacturing Technologies Pt. 2

15-16: Session Five – Coal-to-Products Markets

17-18: Session Six – Modeling &amp; Simulation Modeling Tools for Faster Commercialization

19-20: Session Seven – Coal Preparation for Precursor Production Pt. 1

21-22: Session Eight – Coal Preparation for Precursor Production Pt. 2

23-24: Recreation– Enjoying the American West

25-26: About Us – A Groundbreaking New Research and Manufacturing Facility

**Randall Atkins**CHAIRMAN AND CEO,  
RAMACO CARBON**A NEW FUTURE FOR COAL**

What if coal was too valuable to burn? At Ramaco Carbon, we believe that recent developments in advanced materials and manufacturing technologies, combined with new research, will soon get us to this point. We see coal's properties ultimately serving higher value purposes far beyond energy production.

Through the work that will be discussed this week, the possibilities are expanding for both the constructive and commercial uses of coal's carbon and chemical properties. From that research, this resource will be properly regarded as an elemental building block for many things, some essential and some not even yet considered.

We welcome you to the Ramaco Research Rodeo, a forum to exchange ideas, foster collaborations, and help move the coal-to-products field forward. Thank you for joining us. We look forward to working together to transform how coal is not only used, but how it is perceived.

All the best,



# SCHEDULE: JULY 11

## OPENING

8:15 - 8:35AM

A Future for Coal Randall Atkins, Ramaco Carbon

## SESSION ONE

8:35 - 10:15AM

Coal Composition in the Powder River Basin Ken Woodring, Ramaco Carbon

Understanding the Anatomy of Coal Nicola Ferralis, MIT

Enabling Production from Coal & Related Materials Tom Tarka, NETL

Fingerprinting Coal Tars & Pitches Don Collins, WRI

## BREAK

10:15 - 10:30AM

## SESSION TWO

10:30 - 12:10PM

New Approaches for Converting Coal into Carbon Products Chris Matranga, NETL

New Carbon Materials & Products R&D Edgar Lara Curzio, ORNL

3D Thermoset Printing "ThermoBot" Moe Khaleel, ORNL

Life Sciences Technology Materials & Products Garrett Lindemann, Ramaco Carbon

## LUNCH

12:10 - 1:10PM

Materials and Manufacturing Revolution Moe Khaleel, ORNL

## SESSION THREE

1:10 - 3:10PM

Carbon Fiber Manufacturing & Precursor Specification Amit Naskar, ORNL

Coal Tar Pitch Processing Towards Mesophase-based Carbon Fiber Matt Weisenberger, University of Kentucky

Coal-Plastic Composites for Construction Applications Jason Trembly, Ohio University

Synthesis of High-Value Carbon Materials from Coal Congjuin Wang, NETL

## BREAK

3:10 - 3:30PM

## SESSION FOUR

3:30 - 5:10PM

Separation Membranes Jeffrey Grossman, MIT

Electronic Components Nicola Ferralis, MIT

Graphene Nanotechnology & Energy Harvesting Sanjay K. Behura, University of Illinois at Chicago

## HORS D'OEUVRES

5:10 - 6PM

## ADJOURN TO RODEO

6PM

# SCHEDULE: JULY 12

## SESSION FIVE

8 - 9:20AM

Carbon Products - The Market Opportunities Charlie Atkins, Ramaco Carbon

Techno-economic and Market Pricing for Carbon Products from Coal Sujit Das, ORNL

Coal to Products from the U.S.A. to China and Back Matthew Targett, Spruceworks

## BREAK

9:20- 9:30AM

## SESSION SIX

9:30 - 11:10AM

Simulation-based Design of Fossil Energy Devices Bill Rogers, NETL

Advanced Carbon Materials in 1/3 the Time Nicola Ferralis, MIT

Property Prediction of Carbon Fiber Reinforced Composites Ray Stuart Fertig III, University of Wyoming

## SESSION SEVEN

11:10 - 12:35PM

Coal Beneficiation Process Technologies Tom Sarkus, NETL

Quality Carbon Feedstocks from Coal Alan Bland/Don Collins, WRI

Extraction, Separation and Tailoring of Precursors Amit Naskar, ORNL

## LUNCH

12:35- 1:35PM

Clean Coal Conversion Technology: A Successful Case Study Richard Wolfe, Carbon Technology Co. / Virginia Carbonite

## SESSION EIGHT

1:35 - 3:45PM

A Novel Olefin Production Process Amit Goyal, Southern Research

Chemicals and Resins from Coal Vijay Sethi, WRI / Thermosolv

Coal Testing: Supercritical CO<sub>2</sub> Pyrolysis Joshua Walter, TerraPower

Coal-Derived Products Pyoungchung Kim, TerraPower

## CONCLUSION

3:45-4PM

Closing Remarks Randall Atkins, Ramaco Carbon

## TOURS

4 - 6PM

Sheridan County Museum

Black Diamond Trail through Former Mining Towns

Site of the iPark and iCam

## ADJOURN TO RODEO

6PM

## 01

## SESSION ONE

## UNDERSTANDING COAL

*Understanding coal and its constituent compounds is a vital step in devising commercially viable process technologies, which will help produce precursor feedstocks for further processing into high-value carbon-based products.*

*This session will dive into the resource's composition and its potential.*

**Moderator: Tom Sarkus**

**NATIONAL ENERGY TECHNOLOGY LABORATORY**

Tom Sarkus is the Senior Industrial Partnerships Manager at the U.S. Department of Energy's National Energy Technology Laboratory. He has worked on DOE's Clean Coal and Fossil Energy technology demonstration programs since their inception in the mid-1980s.

**Ken Woodring**

**RAMACO CARBON**

## COAL COMPOSITION IN THE POWDER RIVER BASIN

Ken Woodring is a retired mining executive with over 40 years of experience in the major coal mining basins of the U.S. Major positions held include EVP Mining Operations at Arch Coal and President CEO of Trinity Coal Corp. He has a BS in Mining Engineering from Pennsylvania State University and is a graduate of the Advanced Management Program at Harvard Business School.

**Nicola Ferralis**

**MASSACHUSETTS  
INSTITUTE OF TECHNOLOGY**

## THE ANATOMY OF COAL

Nicola Ferralis is a Research Scientist in the Department of Materials Science and Engineering at MIT. He leads several experimental research projects in the development of novel materials and technologies for energy/water systems. A native of Italy, he holds a Bachelor's and Master's degree in Physics from the University of Padua and a PhD in Experimental Condensed Matter Physics with distinction from Penn State University.

**Tom Tarka**

**NATIONAL ENERGY  
TECHNOLOGY LABORATORY**

## ENABLING PRODUCTION FROM COAL & RELATED MATERIALS

Tom Tarka is currently employed at the U.S. Department of Energy's National Energy Technology Laboratory in Pittsburgh, PA, and has been instrumental in the development of alternative transportation fuels from coal, natural gas and biomass. He has earned a Certificate in Public Leadership from the Brookings Institution, is a licensed engineer in the Commonwealth of Pennsylvania, and a member of the American Institute of Chemical Engineers (AIChE).

**Don Collins**

**WESTERN RESEARCH  
INSTITUTE**

## FINGERPRINTING COAL TARS AND PITCHES

Don Collins is the Chief Executive Officer of the Western Research Institute, developing NextGen fossil and bio energy and products technologies, including carbon fibers, coal beneficiation, and CO<sub>2</sub> utilization. He also assists Wyoming to expand coal exports and advance CO<sub>2</sub> utilization as part of the Wyoming Infrastructure Authority board. Prior to WRI, Don managed R&D in the Department of Energy into new technologies.



## 02

## SESSION TWO

**EMERGING CARBON MATERIALS AND PRODUCTS**

*Leading-edge researchers are inventing new ways to use coal to produce advanced materials – such as carbon nanotubes, foams, and fibers – at commercially viable prices.*

*This session will discuss the leading carbon materials and products that are ready for transition into commercial products.*

**Moderator: William Rogers**

**NATIONAL ENERGY TECHNOLOGY LABORATORY**

Bill Rogers is a Registered Professional Engineer in West Virginia, and has worked at NETL for 33 years in various roles associated with energy R&D, with interests including computational fluid dynamics in combustion, gasification, fuel cells, and experimentation for CFD model validation.

**Chris Matranga**

**NATIONAL ENERGY  
TECHNOLOGY LABORATORY**

**CONVERTING COAL INTO CARBON PRODUCTS**

Christopher Matranga is a staff scientist in the Materials Engineering and Manufacturing Division at the National Energy Technology Laboratory, with a focus on nanostructured materials. He earned his M.S. and Ph.D from the University of Chicago in Physical Chemistry, his B.S. from the University of Houston-Downtown in Industrial Chemistry and Applied Mathematics, and an M.B.A. from the University of Pittsburgh.

**Edgar Lara Curzio**

**OAK RIDGE NATIONAL  
LABORATORY**

**NEW CARBON MATERIALS AND PRODUCTS R&D**

Edgar Lara Curzio leads the Mechanical Properties & Mechanics Group in the Materials Science & Technology Division at the Oak Ridge National Laboratory, focused on the development and characterization of functional and structural materials. Lara-Curzio received a degree in Engineering Physics from the Metropolitan University in Mexico City, and a Ph.D. in Materials Engineering from Rensselaer Polytechnic Institute in Troy, NY.

**Moe Khaleel**

**OAK RIDGE NATIONAL  
LABORATORY**

**3D THERMOSET PRINTING "THERMOBOT"**

Moe Khaleel is the Associate Laboratory Director for Energy and Environmental Sciences at Oak Ridge National Laboratory, leading a \$260M research portfolio focused on the most critical problems facing society at the nexus of energy, environment, and security. He received his doctorate in structural mechanics from Washington State University and an MBA from the Foster School of Business at the University of Washington.

**Garrett Lindemann**

**RAMACO CARBON**

**LIFE SCIENCES TECHNOLOGY MATERIALS/PRODUCTS**

Garrett Lindemann is the Assistant Director of Business Development and Life Science Specialist for RAMACO Carbon. He has previously held positions with the Chief Technology Office of Roche Diagnostics, Industrial Farmeaceutical Cantabria, and 3DHitech, as well as several start-ups. He earned his undergraduate degrees in Chemistry & Biology from Saint John's University, and a Ph.D. in Molecular Genetics from the University of Kansas.

## 03

## SESSION THREE

**MARKETABLE CARBON PRODUCTS AND MANUFACTURING TECHNOLOGIES PT. 1**

*Decades of research on advanced materials such as carbon fiber has led to refinements in both those materials and their production methods for commercialization.*

*This session addresses the question: "What are the preferred precursor feedstock specifications required to achieve cost-effective manufacturing of advanced carbon materials?"*

**Moderator: Chris Matranga**

**NATIONAL ENERGY TECHNOLOGY LABORATORY**

Christopher Matranga is a staff scientist in the Materials Engineering and Manufacturing Division at the National Energy Technology Laboratory, with a focus on nanostructured materials.

**Amit Naskar**

**OAK RIDGE NATIONAL LABORATORY**

**CARBON FIBER MANUFACTURING AND PRECURSOR SPECIFICATION**

Amit K. Naskar is a senior research staff member and leader of the Carbon and Composites Group in the Oak Ridge National Laboratory's Materials Science & Technology Division. His areas of research include carbon fibers, alternative carbon precursors, sustainable polymeric materials, and composites. Dr. Naskar, a native of India, earned his Ph.D. in Rubber Technology from the Indian Institute of Technology in Kharagpur, India.

**Matt Weisenberger**

**UNIVERSITY OF KENTUCKY**

**COAL TAR PITCH PROCESSING FOR CARBON FIBER**

Matt Weisenberger is Principal Research Engineer for the Center for Applied Energy Research at the University of Kentucky. His research interests include structure-properties-processing relationships for carbon fibers, and nano composites. He has a BS in Chemistry from Georgetown University, and earned both a Masters and PhD in Materials Science and Engineering from University of Kentucky.

**Jason Trembly**

**OHIO UNIVERSITY**

**COAL-PLASTIC COMPOSITES FOR CONSTRUCTION APPLICATIONS**

Jason Trembly is Director of the Russ College's Institute for Sustainable Energy and the Environment at Ohio University. His research focuses on process intensification to increase sustainability in the energy and environmental spaces. Research areas of interest include coal utilization, syngas conversion, natural gas/NGLs conversion, nutrient recovery, high temperature electrochemical systems, and techno-economic studies.

**Congjun Wang**

**NATIONAL ENERGY TECHNOLOGY LABORATORY**

**SYNTHESIS OF CARBON MATERIALS FROM COAL**

Congjun Wang is a Chief Materials Scientist for AECOM, and a contractor for NETL. His research interests focus on the synthesis of a wide variety of nanomaterials such as carbon nanotubes, graphene quantum dots, semiconductor quantum dots, and metal and metal oxide nanocrystals. Wang received his PhD in chemistry from the University of Chicago, and BS from Nanjing University in China.

## 04

## SESSION FOUR

**MARKETABLE CARBON PRODUCTS AND  
MANUFACTURING TECHNOLOGIES PT. 2**

*Decades of research on advanced materials such as carbon fiber has led to refinements in both those materials and their production methods for commercialization.*

*This session addresses the question: "What are the preferred precursor feedstock specifications required to achieve cost-effective manufacturing of advanced carbon materials?"*

**Moderator: Charlie Atkins**

RAMACO CARBON

Charlie Atkins is the Director of Development for the Wyoming Industrial Innovation and Invention Park, or iPark, which is being developed with Ramaco Carbon outside Sheridan, WY.

**Jeffrey Grossman**

MASSACHUSETTS  
INSTITUTE OF TECHNOLOGY

**SEPARATION MEMBRANES**

Jeffrey C. Grossman is the Morton and Claire Goulder and Family Professor in Environmental Systems and a Professor in the Department of Materials Science and Engineering at the Massachusetts Institute of Technology. He received his Ph.D. in theoretical physics from the University of Illinois, performed postdoctoral work at U.C. Berkeley, and was a Lawrence Fellow at the Lawrence Livermore National Laboratory.

**Nicola Ferralis**

MASSACHUSETTS  
INSTITUTE OF TECHNOLOGY

**ELECTRONIC COMPONENTS**

Nicola Ferralis is a Research Scientist in the Department of Materials Science and Engineering at MIT. He leads several experimental research projects in the development of novel materials and technologies for energy/water systems. A native of Italy, he holds a Bachelor's and Master's degree in Physics from the University of Padua and a PhD in Experimental Condensed Matter Physics with distinction from Penn State University.

**Sanjay Behura**

UNIVERSITY OF ILLINOIS,  
CHICAGO

**GRAPHENE NANOTECHNOLOGY  
& ENERGY HARVESTING**

Sanjay Behura is a Research Assistant Professor in Chemical Engineering at The University of Illinois at Chicago. He is strongly focused on the development of low-dimensional materials and nano-architectures, nano-optoelectronic phenomena in complex heterostructure circuits, and emerging photovoltaic science in mixed-dimensional surface-junctions.



## 05

## SESSION FIVE

**COAL-TO-PRODUCTS MARKETS**

*Assessment of the market potential for advanced carbon products is essential to setting performance and cost goals for associated manufacturing technologies.*

*This session will focus on the latest assessments of potential market size, values and growth rates for carbon products made from coal.*

**Moderator: Michael Nowak**

**NATIONAL ENERGY TECHNOLOGY LABORATORY**

Michael Nowak is the University & National Lab Partnerships Manager at the NETL, where he has worked for over 32 years, in capacities including hands-on laboratory research, technology transfer, and education outreach.

**Charlie Atkins**

**RAMACO CARBON**

**CARBON PRODUCTS: THE MARKET OPPORTUNITIES**

Charlie Atkins is the Director of Development for the Wyoming Industrial Innovation and Invention Park, or iPark, which is being developed with Ramaco Carbon on a 15,000 acres mineral resource just outside Sheridan, WY. He is a former Morehead Scholar, Marshall Scholar as well as a Visiting Fellow at the Brookings Institution.

**Sujit Das**

**OAK RIDGE NATIONAL LABORATORY**

**TECHNO-ECONOMIC AND MARKET PRICING FOR CARBON PRODUCTS**

Sujit Das is part of the Senior Research Staff at Oak Ridge National Laboratory, where he's worked for more than 30 years, and led several projects in the areas of resource modeling, energy/economic and policy analysis of numerous resource markets including petroleum, coal, and alternative fuels. He earned a MS and MBA from the University of Tennessee, and a Bachelor of Technology from the Indian Institute of Technology in Kharagpur.

**Matthew Targett**

**SPRUCEWORKS LLC**

**COAL TO PRODUCTS FROM THE U.S.A. TO CHINA AND BACK**

Matthew Targett is the former leader of global R&D initiatives for LP Amina, a multinational environmental engineering company, and former head of Innovation Management for Bayer Technology Services in Asia. He recently joined a new firm named Spruceworks LLC. He has a BS in chemical engineering from Pennsylvania State University and a MS and PhD in chemical engineering from the University of Pennsylvania.

## 06

## SESSION SIX

## MODELING & SIMULATION TOOLS FOR FASTER COMMERCIALIZATION

*The exponential growth in computing power, as well as its increasing affordability, has quickened development of advanced carbon materials and production processes.*

*This session will highlight exciting developments in computer modeling and simulations, and provide insights on how new computer tools can move research toward commercialization more quickly.*



### **Moderator: Chris Matranga**

**NATIONAL ENERGY TECHNOLOGY LABORATORY**

Christopher Matranga is a staff scientist in the Materials Engineering and Manufacturing Division at the National Energy Technology Laboratory, with a focus on nanostructured materials.



### **William Rogers**

**NATIONAL ENERGY  
TECHNOLOGY LABORATORY**

## SIMULATION-BASED DESIGN OF FOSSIL ENERGY DEVICES

Bill Rogers is a Registered Professional Engineer in West Virginia, and has worked at NETL for 33 years in various roles associated with energy R&D. His research interests include computational fluid dynamics in combustion, gasification, chemical looping, fuel cells, and experimentation for CFD model validation. He has a PhD in Mechanical Engineering and an MBA from West Virginia University.



### **Nicola Ferralis**

**MASSACHUSETTS  
INSTITUTE OF TECHNOLOGY**

## ADVANCED CARBON MATERIALS IN ONE-THIRD THE TIME

Nicola Ferralis is a Research Scientist in the Department of Materials Science and Engineering at MIT. He leads several experimental research projects in the development of novel materials and technologies for energy/water systems. A native of Italy, he holds a Bachelor's and Master's degree in Physics from the University of Padua and a PhD in Experimental Condensed Matter Physics with distinction from Penn State University.



### **Ray Stuart Fertig III**

**UNIVERSITY OF WISCONSIN**

## PROPERTY PREDICTION OF CARBON FIBER REINFORCED COMPOSITES

Ray Stuart Fertig III is an associate professor at the University of Wisconsin, and a computational materials scientist with a background in theoretical and applied mechanics. He earned his MS from the University of Wyoming, and a PhD in Materials Science from Cornell University, where he focused on using massively parallel dislocation dynamics simulations to statistically link plastic deformation with dislocation mechanics.

## 07

## SESSION SEVEN

## COAL PREPARATION FOR PRECURSOR PRODUCTION PT. 1

*Over the past several decades, many processes related to coal upgrading, beneficiation and conversion have been developed, with many lessons learned.*

*Speakers in this session will discuss recent developments in coal preparation and precursor production process methods, as well as technologies focused on making products from coal.*



### **Moderator: Jason Trembly**

**OHIO UNIVERSITY**

Jason Trembly is Director of the Russ College's Institute for Sustainable Energy and the Environment at Ohio University. His research focuses on process intensification to increase sustainability in the energy and environmental spaces.



### **Tom Sarkus**

**NATIONAL ENERGY  
TECHNOLOGY LABORATORY**

## COAL BENEFICIATION PROCESS TECHNOLOGIES

Tom Sarkus is the Senior Industrial Partnerships Manager at the U.S. Department of Energy's National Energy Technology Laboratory. He has worked on DOE's Clean Coal and Fossil Energy technology demonstration programs since their inception in the mid-1980s. He holds degrees in chemistry, geology, earth science, and law.



### **Don Collins**

**WESTERN RESEARCH  
INSTITUTE**

## QUALITY CARBON FEED- STOCKS FROM COAL

Don Collins is the Chief Executive Officer of the Western Research Institute, developing NextGen fossil and bio energy and products technologies, including carbon fibers, coal beneficiation, and CO<sub>2</sub> utilization. He also assists Wyoming to expand coal exports and advance CO<sub>2</sub> utilization as part of the Wyoming Infrastructure Authority board. Prior to WRI, Don managed R&D in the Department of Energy into new technologies.



### **Amit Naskar**

**OAK RIDGE NATIONAL  
LABORATORY**

## EXTRACTION, SEPARATION AND TAILORING OF PRECURSORS

Amit K. Naskar is a senior research staff member and leader of the Carbon and Composites Group in the Oak Ridge National Laboratory's Materials Science & Technology Division. His areas of research include carbon fibers, alternative carbon precursors, sustainable polymeric materials, and composites. Dr. Naskar, a native of India, earned his Ph.D. in Rubber Technology from the Indian Institute of Technology in Kharagpur, India.



## 08

## SESSION EIGHT

## COAL PREPARATION FOR PRECURSOR PRODUCTION PT. 2

*Over the past several decades, many processes related to coal upgrading, beneficiation and conversion have been developed, with many lessons learned.*

*Speakers in this session will discuss recent developments in coal preparation and precursor production process methods, as well as technologies focused on making products from coal.*



### Moderator: Tom Tarka

**NATIONAL ENERGY TECHNOLOGY LABORATORY**

Tom Sarkus is the Senior Industrial Partnerships Manager at the U.S. Department of Energy's National Energy Technology Laboratory. He has worked on DOE's Clean Coal and Fossil Energy technology demonstration programs since their inception in the mid-1980s.



### Amit Goyal

**SOUTHERN RESEARCH**

## A NOVEL OLEFIN PRODUCTION PROCESS UTILIZING CO<sub>2</sub>

Amit Goyal is associate director of the Southern Research Sustainable Chemistry and Catalysis group, Energy & Environment, North Carolina, where he is responsible for managing research initiatives and commercial business development in areas of sustainable chemistry, catalyst and process development. Goyal received a Master of Science and doctorate in chemical engineering from New Jersey Institute of Technology.



### Vijay Sethi

**WESTERN RESEARCH  
INSTITUTE/ THERMOSOLV**

## CHEMICALS AND RESINS FROM COAL

Vijay Sethi is the Senior Vice President for Energy Production and Generation business unit at Western Research Institute in Laramie, WY. He is also the Chief Executive Officer of Thermosolv LLC, a for profit spin-off from Western Research Institute. He has over 40 years of R&D experience in energy systems. He received his Ph.D. and MS from Case Western Reserve University, and an MS in Physics from Indian Institute of Technology, Delhi.



### Joshua Walter

**TERRAPOWER**

## COAL TESTING: SUPERCRITICAL CO<sub>2</sub> PYROLYSIS

Joshua Walter works within the Innovation Group at TerraPower LLC and is the lead for the development of nuclear non-electric applications and nuclear hybrid energy systems. Walter earned his doctoral degree in nuclear engineering from Purdue University, where he performed research related to hydrogen generation technology, fuel cells and nuclear system thermal-hydraulics.



### PyoungChung Kim

**TERRAPOWER**

## COAL DERIVED PRODUCTS

Pyoungchung Kim is an Analytical Chemist at TerraPower LLC, and was formerly a research scientist in the Center for Renewable Carbon at the University of Tennessee. His research interests include thermochemical conversion and solvent fractionation of coal. He has a PhD in Civil engineering from the University of Tennessee, and a MS and BS in Environmental Engineering from KonKuk University in South Korea.



# 09

## RECREATION



### WELCOME TO THE AMERICAN WEST

A range of world-class recreational opportunities await you in the Sheridan area. As a region that celebrates its frontier past while embracing a cutting edge future and the great outdoors, we invite you to take some time to enjoy the culture and beauty of Wyoming.



### SHERIDAN WYO RODEO

The local rodeo dates back almost a century, and is a time of great celebration here. Beyond the bucking broncos and horse races, there is also a carnival, a Native American Pow Wow and dance, and a grand Friday parade.

### HIKING, BIKING, AND FISHING

The great outdoors don't get much better than Wyoming. In addition to great hikes all around, fishing guides are available from the Fly Shop of the Bighorns, and bike rentals can be made found at Sheridan Bicycle.



### LAND OF NATIONAL PARKS

You're a short drive from Yellowstone National Park, Bighorn National Forest, Grand Tetons National Park, Black Hills National Forest, and much more. Grab a guide book, hop in the car, and enjoy some stunning sights.

### SHOPPING AND DINING

Historic downtown Sheridan and the surrounding area have a range of shops and restaurants. We recommend King's Saddlery for your Western decor, Frackleton's for dinner, and the Mint Bar for a cold beverage.



# 10

## ABOUT US

### THE FACILITY



## //01

### ICAM RESEARCH //

The Advanced Carbon Materials Center will house national laboratories, university and private research groups, hosting applied research and development on the commercialization of coal-based carbon products.



## //02

### IPARK MANUFACTURING //

A 100+ acre "coal to products" industrial park, commercializing research from the iCAM and utilizing coal from the Brook Mine to create high-value carbon products.



## //03

### BROOK MINE RESOURCES //

With 1.1 billion tons of coal resource on a 15,000 acre site, this local thermal mine will provide low-cost feedstock for coal-focused research and development.



### A FIRST-OF-A-KIND PROJECT

Here in Sheridan, Wyoming, we are building what we believe is the first vertically intergrated coal resource, research and mine-mouth manufacturing platform in the world. The Coal to Products Platform will offer occupants a unique ability to perform and commercialize their research.

Together these components provide the infrastructure to mine coal, research its potential to be developed into carbon based commercial products, and to manufacture such products in mine mouth facilities contiguous to the coal resource.

# INNOVATING COAL.

2018 R3  
ORGANIZING  
COMMITTEE

**CHARLES ATKINS** - RAMACO CARBON

**DON COLLINS** - WESTERN  
RESEARCH INSTITUTE

**EDGAR LARA-CURZIO** - OAK RIDGE  
NATIONAL LABORATORY

**CHRIS MATRANGA** - NATIONAL  
ENERGY TECHNOLOGY LABORATORY

**JEFFREY GROSSMAN & NICOLA  
FERRALIS** - MASSACHUSETTS  
INSTITUTE OF TECHNOLOGY