PROVIDING SOLUTIONS TO NATIONAL ENERGY CHALLENGES

NETL'S MATERIALS SCIENCE & ENGINEERING

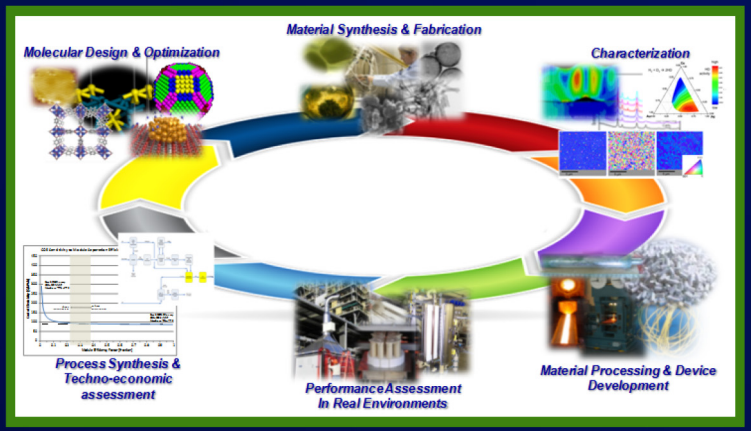
100 Years of Leadership and Innovation

For the last 100 years, the National Energy Technology Laboratory (NETL) has been on a quest to provide relevant materials solutions. At NETL, materials science inspires our researchers to embrace new perspectives and consider the impossible as they strive to answer industry's challenges. As an integral part of an internationally recognized, government-owned research facility, NETL's Materials Science & Engineering Focus Area (MSEFA) provides solutions to materials challenges facing the nation. The MSEFA is able to accomplish this mission through a combination of world-class facilities and a talented, multi-disciplinary staff.

Research Focused on Solutions

NETL's capabilities can be used to solve industry's most challenging materials requirements.The breadth of facilities and intellectual capital within the NETL enables the provision of solutions across the research and development continuum. Through existing competencies, NETL can assemble the right team using the right technology to arrive at the right solution in a timely and cost effective manner.

ACCELERATING DISCOVERY, DEVELOPMENT & DEPLOYMENT



MSEFA'S WORLD-CLASS CAPABILITIES

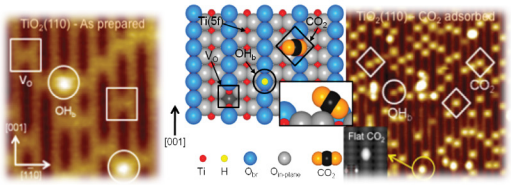
Materials	Approaches	Technologies
• Metal alloys & composites • Electro-ceramics • Polymers & composites • Molten salts • Nanomaterials • Refractory ceramics	• Design & optimization • Material synthesis • Characterization • Performance assessment • Processing & prototype • System integration & engineering and economic assessment	• Alloy manufacturing • Advanced combustion • Gas separations • Turbines • Reaction engineering • Solid oxide fuel cells • Refractory-based liners • Sensors • Batteries • Medical alloys

MSEFA has a long history of discovery, development, and deployment of affordable, high-performance materials and processes that overcome industrial challenges, including:

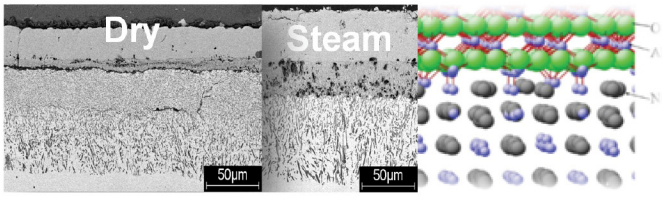
- Analyzing and developing corrosion-, erosion-, and wear-resistant materials able to withstand extreme environments.
- Computer modeling and simulation to accelerate product development and commercialization and to reduce verification and experimentation steps.
- Improving manufacturing by process improvement.
- Using advanced material capabilities to formulate, melt, cast, forge, and heat-treat materials on a prototype/industrial scale.

NETL's world-class research has been recognized by the scientific community, receiving fourteen R&D 100 awards over the past 5 years.

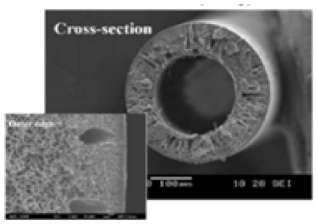
ADSORPTION PHENOMENON



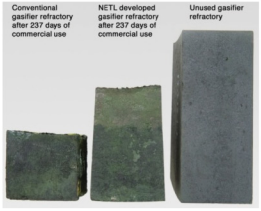
EVALUATION OF MATERIALS IN REALISTIC ENVIRONMENTS



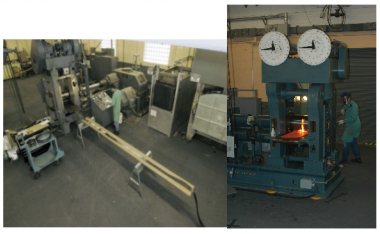
MATERIALS INTO DEVICES



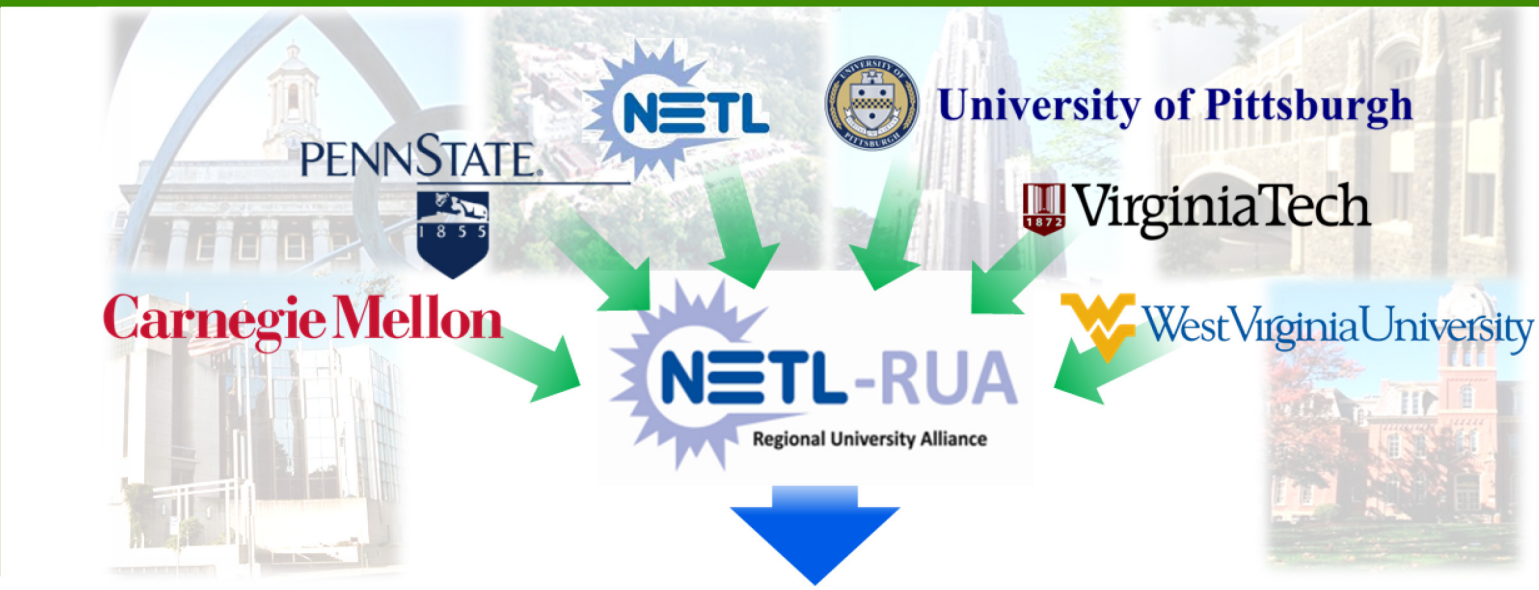
FIELD TRIALS



ALLOY PROCESSING



COLLABORATIVE R&D FOR TECHNOLOGY ADVANCEMENT



Shared Resources + Shared Intellect = Targeted Innovation

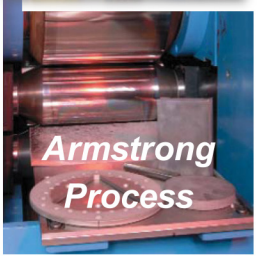
Create and enable **dynamic** teams to do **targeted** research that effectively provides solutions to the Nation's most challenging problems

Computational & Basic Sciences - Energy Systems Dynamics - Geological & Environmental Systems - Materials Science & Engineering

Technology Spotlight

In collaboration with Boston Scientific Corporation, NETL developed a novel platinum-chromium alloy for coronary stent applications. The revolutionary alloy allows for detection on x-ray devices while providing unprecedented flexibility and corrosion resistance. The technology has become the leading stent platform in the world accounting for more than $4 billion in sales since its introduction in 2010.

In collaboration with industry and academic partners, NETL validated and advanced its novel high-temperature, chemically stable catalyst for converting heavy hydrocarbons into hydrogen-rich synthesis gas for use in solid oxide fuel cells. This technology was licensed to start-up company Pyrochem Catalyst Corporation and is under development for commercial applications.



NETL and International Titanium Powder, LLC developed a process to produce titanium alloy powders in a continuous manner. The Armstrong Process significantly reduces temperature and pressure requirements as compared to conventional batch processing, significantly lowering production costs.

NETL welcomes the opportunity to build mutually beneficial partnerships with industry, academia, and other national entities to address material-related challenges.

WORKING WITH NETL AND ITS PARTNERS

About NETL

The National Energy Technology Laboratory, part of the U.S. Department of Energy's national laboratory system, is owned and operated by the Department of Energy (DOE). NETL supports DOE's mission to advance the national, economic, and energy security of the United States.

In addition to research conducted onsite, NETL's project portfolio includes R&D conducted through partnerships, Cooperative Research and Development Agreements, financial assistance, and contractual arrangements with universities and the private sector. Together these efforts focus a wealth of scientific and engineering talent on creating commercially viable solutions to national energy and environmental problems.

NETL has research facilities in **Albany, OR, Morgantown, WV, and Pittsburgh, PA.**

Partnership Arrangements

NETL has several different types of agreements for industrial collaborations. These include Cooperative Research and Development Agreements, Contributed Funds Agreements, and Nondisclosure Agreements. These instruments enable industrial partners to negotiate an agreement suitable for their needs including Go/No-Go decision points to ensure progress aligns with expectations. Once a technology is developed, it could be available for licensing.

More information about working with NETL's Material Science and Engineering Focus Area can be found at: **www.netl.doe.gov/onsite_research/materials-science.html**

Or you can contact us directly at: **materials.solutions@netl.doe.gov**