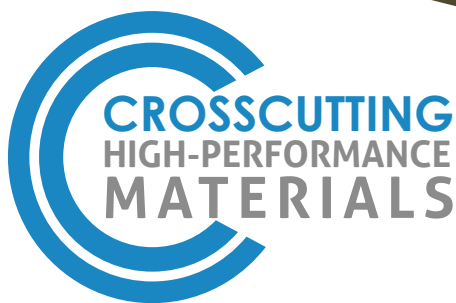




HIGH-PERFORMANCE
MATERIALS





High-Performance Materials focuses on material discovery and development that will lower the cost and improve the performance of fossil-based power-generation systems.

Materials of interest are those that enable components and equipment to perform in the harsh environments of an advanced power system. The NETL Crosscutting Research program focuses its materials research in four primary platforms:

- **COMPUTATIONAL MATERIALS DESIGN**
- **ADVANCED STRUCTURAL MATERIALS**
- **FUNCTIONAL MATERIALS FOR PROCESS PERFORMANCE**
- **ADVANCED MANUFACTURING**

NETL leads a national laboratory consortium, **Extreme Environment Materials (ExtremEmat)** that accelerates the development of extreme environment materials. The consortium uses the capabilities of several national laboratories to create the next generation of cross-cutting computational and experimental toolsets focused on accelerating discovery and scale-up for manufacturing materials at scale.

Affordable and durable materials are a key enabling technology that cross-cuts fossil energy platforms and systems.

COMPUTATIONAL MATERIALS DESIGN

Utilizes computational materials modeling to enable rapid design and simulation of new and novel alloys. Computational methods are also used to provide validated models capable of simulating and predicting long-term performance and failure mechanisms of the newly developed materials.

ADVANCED STRUCTURAL MATERIALS

Provides advanced materials that enable deployment of transformational technologies that are capable of operating in harsh environments. Both improved alloys and coatings are developed that meet the criteria for high-temperature corrosive environments that are key to achieving higher efficiencies and reducing environmental emissions.

PROCESS PERFORMANCE MATERIALS

Develops advanced functional materials that enable the deployment of process technologies. These materials must be capable of operating in the harsh environments associated with these new technologies including coatings, sorbents, and catalysts.

ADVANCED MANUFACTURING

Leading edge industry methodologies provide processes for fabricating and assembling components. Advanced manufacturing decreases component cost through new designs and malleable material concepts.

MATERIALS RESEARCH HAS THE FOLLOWING IMPACT ON ENERGY DEVELOPMENT AND PROCESSES:

- Utilizes multi-scale computational methods to predict alloy behavior in a variety of relevant environments
- Develops techniques for the virtual and rapid design of materials using advanced manufacturing
- Facilitates process intensification for lowering cost and reducing material requirements
- Accelerates the selection and qualification for service of materials



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