

PREDICTIVE APPROACH ACCELERATES THE DEVELOPMENT OF ADVANCED MATERIALS AND MANUFACTURING PROCESSES

Argonne provides industry a competitive edge by overcoming fundamental scientific roadblocks to accelerating innovation.

Argonne can provide the R&D support to accelerate advanced materials scale-up and process optimization capabilities. Argonne will more than double its scale up and manufacturing space with the opening in FY19 of the expanded Materials Engineering Research Facility. This will provide a convening ground for partnerships between Argonne, industry, national labs, and academia on manufacturing science and engineering.

To accelerate innovation and US manufacturing leadership, Argonne leverages its deep scientific expertise and core capabilities in following three areas:and

MATERIALS AND CHEMISTRY

- Department of Energy’s only materials scale up facility
- World-leading experts in discovery and synthesis

ADVANCED CHARACTERIZATION

- The Advanced Photon Source is the nation’s highest energy X-ray synchrotron for *in situ*, *in operando* studies in extreme environments
- Center for Nanoscale Materials

HIGH-PERFORMANCE COMPUTING

- Nation’s first exascale computing
- Machine learning and edge computing for real-time control
- Simulations to narrow design options

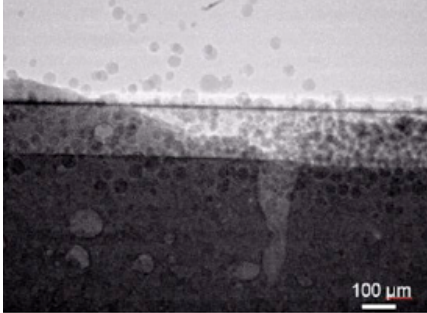
BENEFITS

- Reduced trial and error design
- Optimized material properties
- Reduced defects and energy consumption
- Early-stage techno-economic analysis for go/no-go decision on commercial scalability
- Accelerated transition from discovery to commercialization
- Simultaneous analysis with multiple techniques across length scales for fast, comprehensive results
- Novel processing techniques to cut manufacturing costs
- Predictive computer modeling to develop new materials and catalysts in months not years or decades



ADVANCED MANUFACTURING

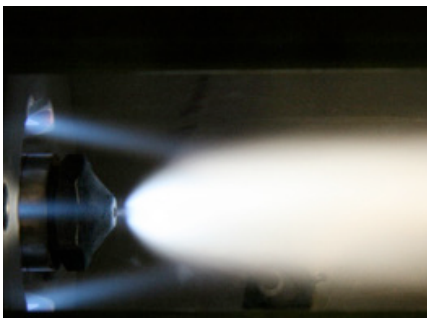
CASE STUDIES



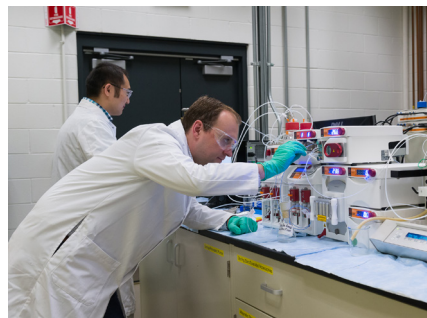
In-situ melting/sintering characterization of real-time defect formation in 3-D printing melt pool is leading to the optimized feedstock and processing parameters.



The development of an ultra-fast boriding process increased energy efficiency 80% at 15% of the cost of other coatings.



The most advanced diagnostic system for flame spray pyrolysis enables the manufacturing of complex, catalysts in high volumes.



The development of a cost-effective scaleup process for advanced cellulose nanocrystal (CNC) opens the door for their use in high-value energy materials.

PARTNERS

Argonne worked with 160 manufacturing companies in the last four years. These companies were in a variety of industries including: aerospace, transportation, chemicals, materials, and industrial goods.

EXPANSION OF THE MATERIALS ENGINEERING RESEARCH FACILITY



Expansion to open doors in FY2019

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