

# 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:

### 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 source for in-situ, in-operando studies in extreme environments
- Center for Nanoscale Materials

### HIGH-PERFORMANCE COMPUTING

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

### BENEFITS

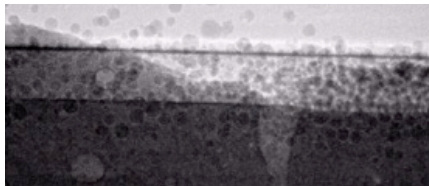
- Reduced trial and error design
- Optimized material properties
- Reduced defects and energy consumption
- Early-stage techno-economic analysis for go/no-go decision on commercial scalability

### 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.



**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 cellulosic nanocrystal (CNC) opens the door for their use in high-value energy materials.

**EXPANSION OF THE MATERIALS ENGINEERING RESEARCH FACILITY**



Expansion to open doors in FY19

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