



# ACCELERATING THE DEVELOPMENT AND SCALE-UP OF **COMPLEX** NEW MATERIALS IN HIGH-VALUE APPLICATIONS

## THE CHALLENGE

Developing new chemistry-based materials requires not only the expertise of researchers, but also the right tools and facilities. Since creating new materials is costly, many manufacturers can't take the financial risks, let alone take on the complex scale-up process.

Materials invented in the discovery stage of research are typically produced in gram quantities, with initial processes scalable to produce materials up to hundreds of grams. Scaling to kilogram or larger scale, however, can require substantial process modifications — until that step occurs, economics, product consistency and quality are uncertain.

## THE INNOVATION

The U.S. Department of Energy's (DOE's) Argonne National Laboratory established the Materials Engineering Research Facility (MERF), a collaborative endeavor built with funds from the Vehicle Technologies Office within DOE's Office of Energy Efficiency and Renewable Energy.

The facility is designed to develop cost-effective manufacturing processes to scale up promising new materials, and bridge the gap between research and commercialization. Using cutting-edge instruments and laboratories, MERF researchers develop scalable processes and produce kilogram quantities of various advanced materials.

MERF researchers share the samples they produce with industry and academia for evaluation and validation and use them to advance basic research. Research taking place at the MERF often results in new inventions that, when licensed, may represent a competitive advantage for commercial partners.

Historically, the focus of MERF research has been on scaling battery materials for electrical vehicles, but MERF expertise and facilities can be applied to many classes of materials and their associated scale-up processes.

## THE IMPACT

- Numerous companies, universities and national laboratories have leveraged the MERF to test and develop new materials, including catalysts, membranes, sorbents, and printed electronics.
- Argonne's combination of in-situ diagnostics and characterization, computer modeling and artificial intelligence, innovative process technology, and expertise in materials science supports a wide range of research needs. Taken together, these capabilities enable the MERF to pursue process research and engineering advances that might not be possible in other environments.

## CONTACT

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