

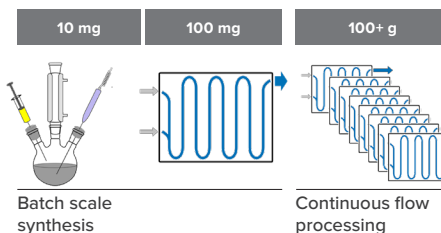
MANUFACTURING BREAKTHROUGHS MAKE NEXT-GENERATION ENERGY MATERIALS COST-EFFECTIVE AT SCALE

Continuous processes enable large-scale production of high performance nanomaterials for energy conversion and storage, with practical production times, affordable labor costs, and material consistency.

Fine organic materials, specialized catalysts and other complex nanomaterials can potentially transform energy conversion and storage. Manufacturing these materials at commercial-scale, however, is impractical without a way to efficiently and precisely control reaction conditions. So-called batch mode production lack this feature and results in batch-to-batch variability, long production times, high costs, and reduced material quality and performance.

Argonne has coupled its expertise in process R&D and materials manufacturing scale up with the laboratory’s high-performance computing and x-ray science capabilities to create the Advanced Synthesis Continuous Flow Reactor program. Researchers use x-ray imaging to capture and characterize material reactions as they occur, and subject the resulting data to predictive analytics and modeling. Armed with an ever-increasing understanding of the material reactions, researchers rapidly fine-tune processes to achieve uniform material structure, morphology and composition, for optimal properties and performance.

Argonne invites industry to innovate their materials manufacturing by using breakthrough synthesis and analysis tools to streamline the discovery to production timeline. Argonne can help develop samples of new materials at pre-pilot-scale or develop new scalable processes for existing material.



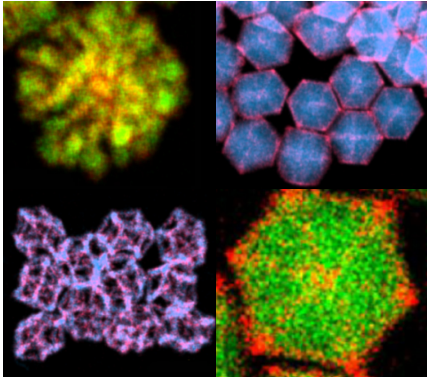
Unlike batch synthesis, microfluidic synthesis precisely controls reaction conditions for consistent nanomaterials produced at scale

CONTACT

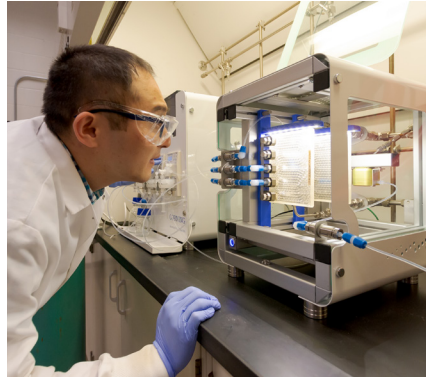
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THE ARGONNE ADVANTAGE

Combining materials manufacturing expertise with high-performance computing and x-ray science



Pivotal discoveries in the development and batch synthesis of advanced nanomaterials.



MERF researchers prepare continuous flow reactor for the synthesis of advanced nanomaterials

MATERIAL BENEFITS

- Practical production times
- Affordable costs
- Uniform structure, size and composition
- Tailored properties
- Optimal performance
- Simplified on-demand production
- Expedited R&D
- Increased manufacturing safety



At the Advanced Photon Source, some of the world's brightest x-rays capture and characterize material reactions as they occur.



The Argonne Leadership Computing Facility (ALCF) offers world-leading power for machine learning, simulations, modeling and other analytics.

INTEGRATED APPROACH

