ADVANCED MANUFACTURING LABORATORY

at Lawrence Livermore National Laboratory's Livermore Valley Open Campus

accelerating manufacturing technology development through strategic partnerships

BECOME A **STRATEGIC PARTNER** OF THE ADVANCED MANUFACTURING LABORATORY

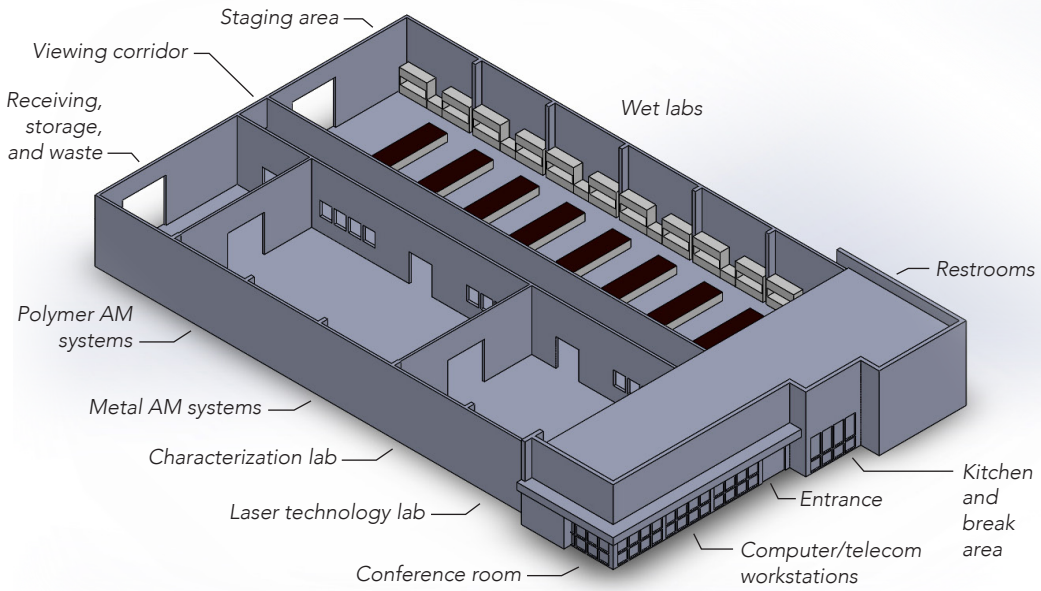
Since 1952, Lawrence Livermore National Laboratory (LLNL) has provided solutions to the nation's most important national security challenges through innovative science, engineering, and technology. Our new Advanced Manufacturing Laboratory (AML) will bring together science and engineering expertise, leading-edge technology, academic partners, and industry experience under one roof.

Located in the heart of the Livermore Valley Open Campus and adjacent to LLNL's main campus, the AML will be the birthplace of tomorrow's most innovative manufacturing processes and products. We are actively searching for strategic partners to help make this vision a reality.

The AML will house some of the most sophisticated and capable equipment in the field of advanced/additive manufacturing, some of which are not yet commercially available. Additional resources will include material evaluation and characterization equipment, access to high-performance computing (HPC) modeling and simulation capabilities, and manufacturing systems from several active LLNL research programs. Advances made at the AML will be motivated and accelerated through a motivation of dual-purpose applications—both commercial and government products.

FACILITY SPECIFICATIONS

The AML is a $10 million, 14,000-square-foot facility scheduled for operation in the summer of 2018. The facility is designed to accommodate a wide range of equipment and materials.



WET LAB approximately 5,000 square feet total with over 150 square feet of fume hood working space as well as reconfigurable workbenches, cabinetry, and electrical and mechanical utilities

DRY LAB approximately 5,000 square feet total with Class II, Division 2 enclosure for processing reactive materials

CENTRAL corridor for observation and individual room access

PARTITIONING for maintaining confidential work areas

MULTIMEDIA conference room

SHARED work area with computer and network access

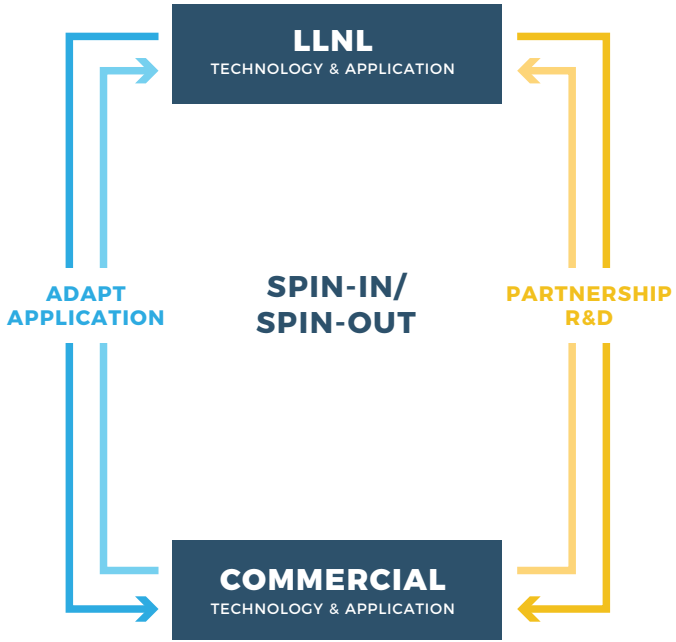
LEED Gold Certification

STRATEGIC PARTNERSHIPS

AML strategic partners will enjoy research and development benefits via forward-thinking agreements tailored to each party's needs. Our goals:

- Ensure exclusive space allocation if needed
- Define equipment use
- Preserve industry intellectual property ownership
- Respect confidentiality

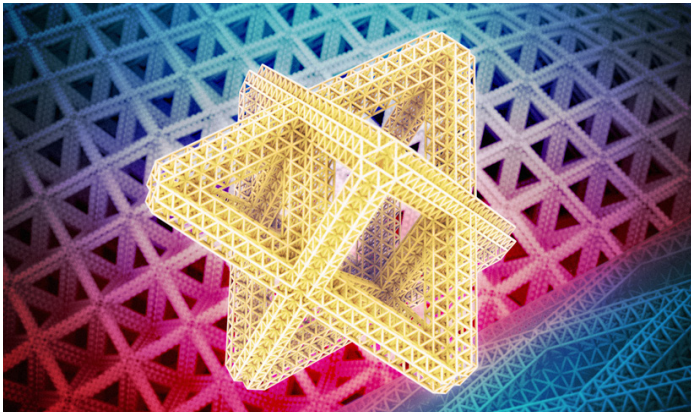
Our mutually beneficial partnership strategy is driven by a concept known as Spin-Out/Spin-In. Technology developed at the AML "spins-out" for commercial application and development, while also offering the opportunity for LLNL to "spin-in" commercially developed products or processes. The process also works in the other direction: The commercial partner's technology is enhanced with LLNL advancements and expertise, after which it is adapted to the partner's products.



TECHNOLOGY TRACKS

Manufacturing is undergoing a dramatic transition enabled by new techniques, new materials, and HPC modeling and simulation resources. At the AML, our leadership and expertise in manufacturing science will help partners address a wide range of market challenges while reducing production costs and time.

We are establishing five technology tracks for AML partnerships, all of which have commercial and government applications.

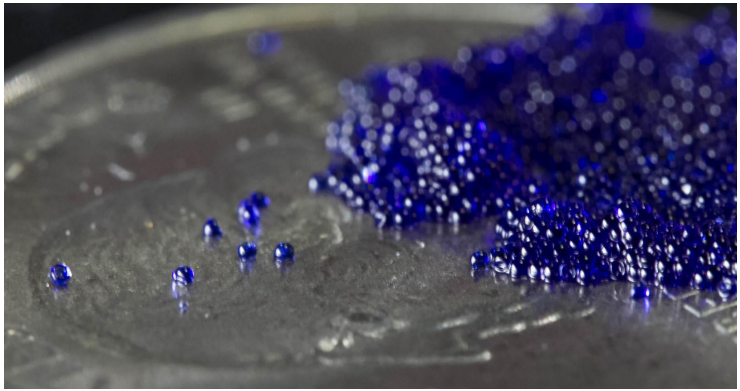


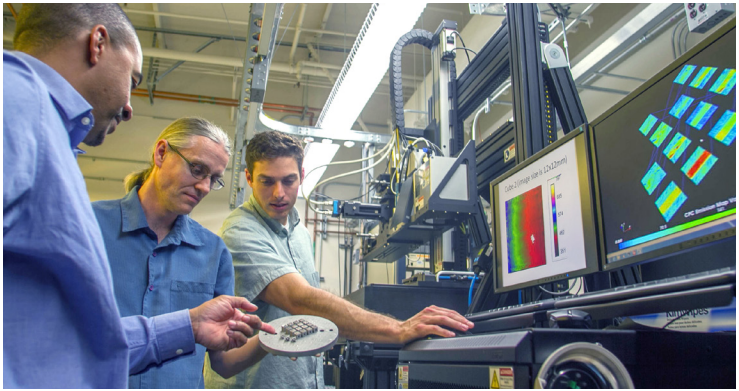
TECHNOLOGY TRACK 1 // DESIGN

High-performance materials, devices, components, and assemblies enabled by innovative HPC modeling and simulation

Advanced algorithms enable scientists to solve challenging design and manufacturing problems and drive materials development in new directions. A pioneering initiative at LLNL uses mathematical optimization methods to improve the design process resulting in unique materials with unnatural properties or completely new and nonintuitive product topologies based on user requirements.

TECHNOLOGY TRACKS





TECHNOLOGY TRACK 2 // MATERIALS

Unique, custom, high-quality feedstocks and nanomaterials

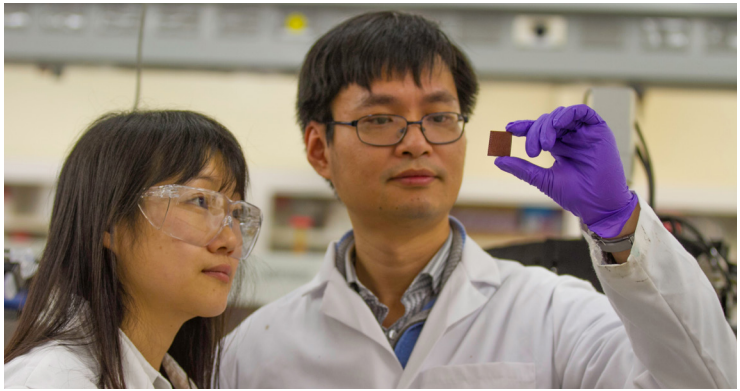
LLNL's expertise in synthesis and characterization covers a spectrum of materials, including liquid photo resins, metal particles, wires and melts, sophisticated nanomaterials, and other custom feedstocks and mixtures. High-quality feedstocks at scale are critical to advancing manufacturing processes.

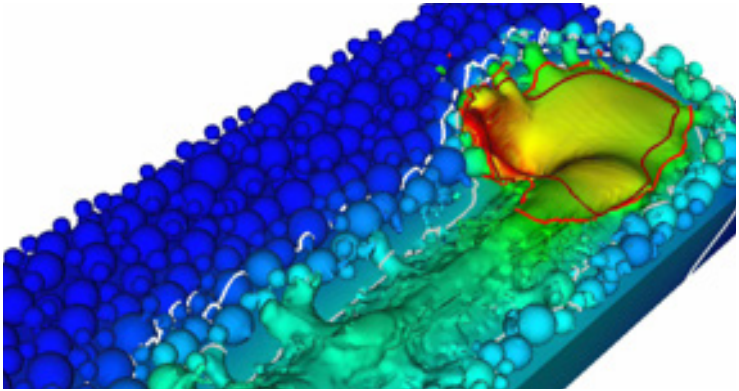
TECHNOLOGY TRACK 3 // PROCESSES

Laser systems, advanced optics, multi-material solutions, precision motion, extrusion, and post-processing techniques

LLNL develops new manufacturing processes for a range of materials and length scales from custom direct-ink writing extrusion to laser diode-based systems, which could produce objects orders of magnitude faster and at reduced cost—just to name a few.

TECHNOLOGY TRACKS





TECHNOLOGY TRACK 4 // APPLICATIONS

Novel technologies and products to transform transportation, energy, medical, and defense sectors

LLNL scientists and engineers develop materials for a range of applications, such as 3D-printed graphene aerogel for batteries and supercapacitors; ultra-lightweight, strong, stiff materials; and even new materials and structures for carbon dioxide capture.

TECHNOLOGY TRACK 5 // QUALIFICATION & CERTIFICATION

Process simulation, in situ diagnostics, characterization, testing, and evaluation for reliable products

LLNL accelerates qualification by using HPC process modeling and simulation paired with in situ diagnostics, targeted experiments, data mining, and uncertainty quantification. Our methods optimize the heating, melting, cooling, and solidification processes associated with metal additive manufacturing. We apply similar methods to a number of emerging advanced manufacturing technologies.

adv-manufacturing.llnl.gov

Lawrence Livermore National Laboratory

Lawrence Livermore National Laboratory is operated by Lawrence Livermore National Security, LLC, for the U.S. Department of Energy, National Nuclear Security Administration under Contract DE-AC52-07NA27344. LLNL-BR-736178

PATRICK DEMPSEY
925-423-1868
dempsey4@llnl.gov

CHRIS SPADACCINI
925-423-3185
spadaccini2@llnl.gov