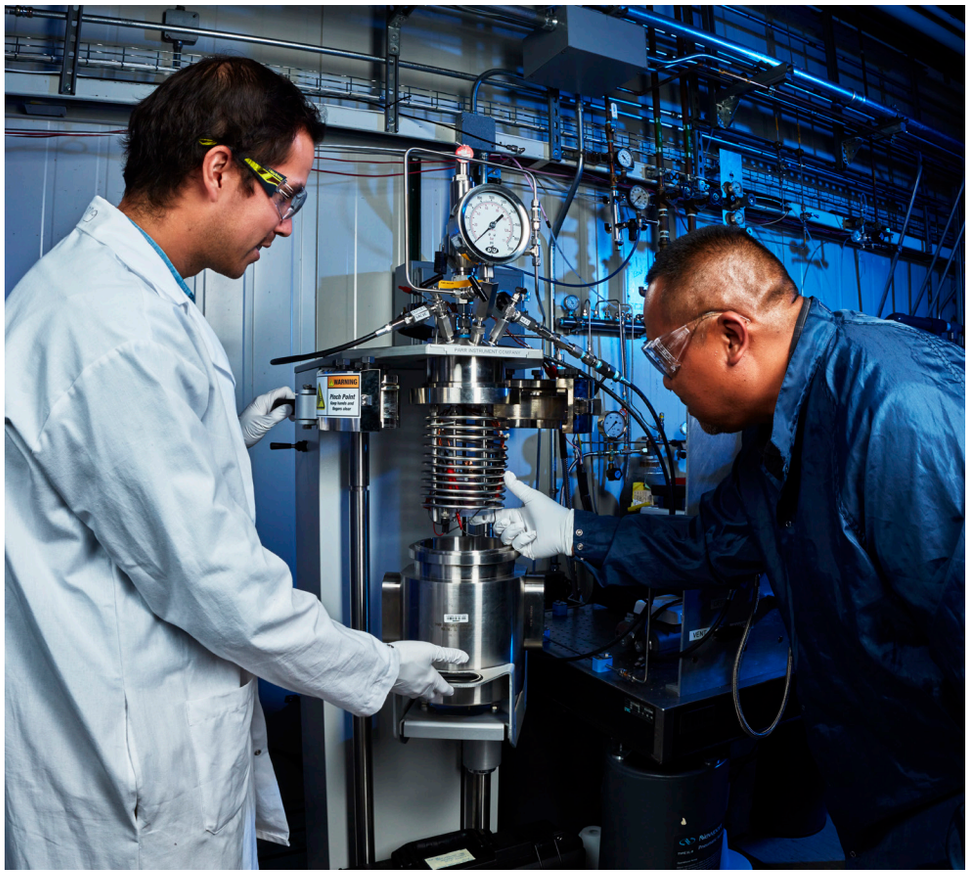
CMNT | The Center for Micro- and Nanotechnology

A collaborative space for materials research, device fabrication, and system integration

The Center for Micro- and Nanotechnology (CMNT) at LLNL includes characterization and biosafety laboratories, a clean room, and sophisticated engineering capabilities to facilitate materials research and fabricate field-ready devices at meso-, micro-, and nanoscales—on the order of billionths of a meter.

We provide state-of-the-art processing capabilities, including plasma and wet etching, thin-film deposition, micro- and nanolithography, packaging, and metrology. And, we aid in the research of microelectromechanical systems (MEMS), electronics, photonics, lasers, quantum computing, and bio-implantables.

Key advancements over the last four decades in micro- and nanotechnology have enabled revolutionary growth in microelectronics, microsensors, and



Staying cool under pressure: LLNL researchers from across the Lab have developed a cutting-edge tool that uses electrochemistry to convert supercritical CO2 into commodity chemicals—a step forward in reducing our global carbon footprint.

biomedical devices in the commercial arena. The CMNT has been a leader in fueling this commercial growth while simultaneously customizing technologies for unique, non-commercial applications that are mission-specific to LLNL and DOE. Our work supports national security missions in stockpile stewardship, homeland security, directed energy, nonproliferation, biomedical research, quantum computing and other areas of national interest. For instance, LLNL researchers from across the Lab have developed a cutting-edge tool that uses electrochemistry to convert supercritical CO2 into commodity chemicals—a step forward in reducing our global carbon footprint.

Did You Know?

This facility has world-leading capabilities in additive biomanufacturing (3D printing) of human and other biological tissues and organoids in its biosafety level 2 laboratory. And, it hosts a unique biomedical device foundry with a dedicated toolset for microfabricating human-use implantable medical devices such as neural interfaces—devices that exchange information with the brain.

Our microfabricated materials are also used in…

Electronics and semiconductors—some of which have medical uses, like electrodes implanted in the brain to regulate seizures

Photonics (the science of light waves)—to manipulate light in lasers or xrays that give us insight into how bodies, materials, and weapons work

Microelectromechanical systems (MEMS) that involve microscopic electronics and moving parts—these are largely used in sensors that detect and communicate information about different environments or environmental conditions

Microfabrication is often done using additive or subtractive manufacturing. Additive manufacturing (aka 3D printing) deposits layers of building materials, while subtractive manufacturing cuts or grinds material from a solid shape. Sometimes a combination of these approaches is used to create miniscule patterns and designs.

CMNT also engages in and seeks partnerships with universities, industry, and government agencies to accelerate discovery and speed the transformation of applied research into technologies for national security applications or the commercial market.

" The combination of our world-class R&D talent and unique fabrication facilities has enabled highly innovative and custom solutions to technology needs in the areas of stockpile monitoring and stewardship, homeland security, power and energy systems, healthcare, and space applications."

Naiad – Saturn Surrogate: LLNL researchers from MED, WCI, and NIF developed a sensor integration subassembly and a flexible, thin-film resistive temperature device to measure temperature change of a material from exposure to high energy neutrons at NIF."

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