



Critical Materials Institute
AN ENERGY INNOVATION HUB

FACTSHEET



What is the Energy Innovation Hub for Critical Materials?

Created by the U.S. Department of Energy, the Energy Innovation Hub is operated under the name the Critical Materials Institute. CMI is led by the DOE's Ames Laboratory, and managed by DOE's Advanced Manufacturing Office. It brings together the expertise of DOE national laboratories, universities, and industry partners to eliminate materials criticality as an impediment to the commercialization of clean energy technologies.

What are "critical" and "near critical" materials?

Certain substances provide essential capabilities, such as light emission or magnetism, and when the supply of one of these substances is at risk, it becomes a "critical" material. The DOE has identified five rare-earth materials – neodymium, europium, terbium, dysprosium and yttrium – as critical materials, materials essential for America's transition to clean-energy technologies. The DOE has identified two additional elements, lithium and tellurium, as "near-critical" materials. These non-rare-earth materials play an indispensable role in emerging energy storage and battery technologies, such as hybrid and electric vehicles, wind turbines, and photovoltaic thin films.

Why is the Critical Materials Institute important?

Although they are used in relatively small quantities, shortages of critical materials can impact entire industries and prevent the implementation of technologies that could provide cleaner energy or reduce energy demand. CMI is the nation's premier research, development and deployment institute for critical materials, their alloys and oxides. Driven by a "think-tank" philosophy, CMI is a team of multi-disciplinary, world-class researchers and technology developers, dedicated to finding innovative solutions and carving creative, transformational paths to eliminating the criticality of rare-earths and other materials. This is being achieved through the diversification of supplies, development of substitutes, and the improvement of usage efficiency, reuse and recycling.

CMI scientists are working to design separations agents to improve the production efficiency and economic viability of new rare-earth mines, thereby promoting the diversity of supply of critical rare earths. They are also working to improve the utilization of critical materials in manufacturing. They will develop and deliver transformative and environmentally benign technologies that increase the supplies of critical rare earths, enhancing efficient reuse and recycling of feedstocks that will further diversify the global supply chain of critical materials, and designing new chemical extractants that will transform the recovery of lithium from highly concentrated brines. Ultimately, CMI will invent and qualify new materials for use in existing products and help to redesign products to capitalize on these new materials.

Who are the Team Members of the Critical Materials Institute?

CMI's 300-plus researchers include representatives from four DOE national laboratories: The Ames Laboratory, Idaho National Laboratory, Lawrence Livermore National Laboratory and Oak Ridge National Laboratory. Member universities include Brown University; Colorado School of Mines; Florida Industrial and Phosphate Research Institute; Iowa State University; Purdue University; Rutgers; and the University of California at Davis. Industrial partners round out the team. They include Advanced Recovery, Cytec Industries, Eck Industries, Inc., GE, Molycorp, OLI Systems, Simbol Materials, and United Technologies Research Center.

What are CMI's funding and timeline?

In January 2013, DOE announced the award of \$120 million to support this Hub for five years; and work commenced in June of the same year. The Hub is eligible for one additional five-year funding increment if it makes a sufficiently strong case for renewal in 2018.

Why is The Ames Laboratory leading the Critical Materials Institute?

The Ames Laboratory is a national resource in rare-earth and other materials science and technology. The Laboratory has been a world leader in rare-earth science for most of its history. It has delivered a steady stream of discoveries, ranging from superconducting compounds to alloys with special magnetic and mechanical properties. The Lab's Materials Preparation Center has established itself as the preferred source of certified, research-grade, high-purity rare-earth samples to researchers around the world.

The Ames Laboratory provides the central physical location for the hub. The Colorado School of Mines, with the nation's leading programs in mineral economics and in mineral processing and extractive metallurgy, holds the second spot in the chain of command and works side by side with The Ames Laboratory to support the overarching mission of the Institute.

How are projects performed within CMI?

CMI creates technology-level and project-level roadmaps, and works closely with relevant industrial partners across the materials supply chain, from mines to manufactured products, to focus world-leading research tools and talent on some of the most pressing challenges facing today's technology-focused economies.

The CMI forms interdisciplinary, inter-institutional teams from among its members, which can be enhanced by adding outside expertise as needed, to carry out an array of projects with specific timelines and goals. In some cases, CMI may support multiple projects aimed at solving a single problem.

What has CMI achieved so far?

Approximately two years after starting its work, CMI has made 35 invention disclosures, submitted 10 patent applications, and has licensed one technology to an industrial user. With focused teams and unique facilities at its disposal, it has demonstrated that it can significantly accelerate the process of delivering technological solutions to the marketplace

Where can I learn more?

To learn more about the Critical Materials Institute, go to: <https://cmi.ameslab.gov>

For more information about Energy Innovation Hubs, go to: <http://energy.gov/science-innovation/innovation/hubs>

For DOE's Critical Materials Strategy, go to: http://energy.gov/sites/prod/files/DOE_CMS2011_FINAL_Full.pdf

