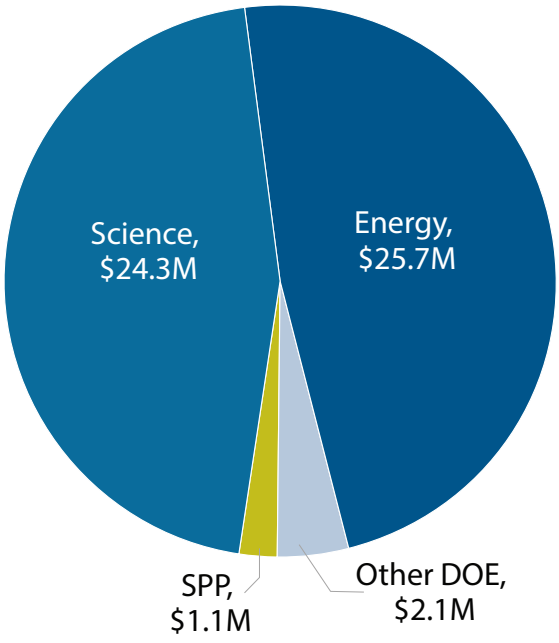
# Ames Laboratory

## At a Glance

U.S. DEPARTMENT OF ENERGY

Ames Laboratory is DOE's materials laboratory focused on the design, discovery, fundamental understanding, and application of materials to energy technologies. We provide the national and global scientific communities with roadmaps to create and discover new materials. Our synthesis, exploration, mapping, and tuning of the physical properties of materials set the research agenda for the scientific community for decades to come. The transition from generating fundamental knowledge of materials to applying this knowledge to solve salient technological and industrial challenges is a significant strength and notable focus for Ames. Through the specialized capabilities and expertise of our world-renowned research teams, we serve the scientific community by making seemingly "impossible" to create materials available to other national laboratories, universities, and industry—enabling and accelerating science and technology across the nation.

## FY 2016 Funding by Source




Lab operating costs: **$53.2M**
DOE/NNSA costs: **$52.1M**
SPP (Non-DOE/Non-DHS) costs: **$1.1M**
SPP as % total Lab operating costs: **2.1%**

## Facts

**Location:** Ames, Iowa
**Type:** Single-program Laboratory
**Year Founded:** 1947
**Director:** Adam Schwartz
**Contractor:**
Iowa State University of Science and Technology
**Responsible Site Office:** Ames Site Office

## Physical Assets

**10** acres and **13** buildings
**340,968** GSF in buildings
Replacement plant value: **$88.6M**

## Human Capital

**303** full-time equivalent employees (FTEs)
**82** joint faculty
**43** postdoctoral researchers
**83** undergraduate students
**102** graduate students
**268** visiting scientists

## Core Capabilities

- Applied Materials Science and Engineering
- Chemical and Molecular Science
- Condensed Matter Physics and Materials Science

## Mission Unique Facilities

- Sensitive Instrument Facility
- Critical Materials Institute—DOE Energy Innovation Hub
- Materials Preparation Center
- Powder Synthesis Facility for Additive Manufacturing

AMES LABORATORY
Creating Materials & Energy Solutions
U.S. DEPARTMENT OF ENERGY

# Ames Laboratory
# Accomplishments

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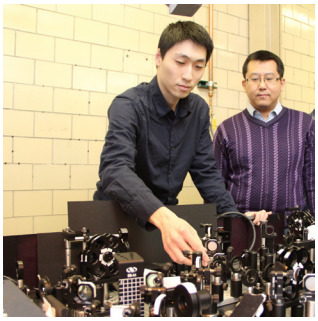
## Unique Facility

### Safeguarding National Energy Security - The Critical Materials Institute

The Critical Materials Institute (CMI), a collaboration of DOE national laboratories and academic and industrial partners led by Ames Laboratory, provides critical knowledge in supplying, replacing, and recycling rare-earth materials. These materials play essential roles in a host of energy technologies ranging from wind turbines to battery technologies that are important to our national energy security. CMI has aggressively accelerated technological developments related to critical rare-earth and lithium-based materials. In less than four years, CMI has filed 35 U.S. patent applications and 61 records of invention that address primary production of critical materials, new materials and processes that do not contain critical materials but match or exceed the performance of those that do, and manufacturing and recycling processes that optimize existing resources. CMI is fully equipped to take on the nation's urgent challenges of critical materials—and to adapt as the nature of criticality evolves over time.

## Research Highlight

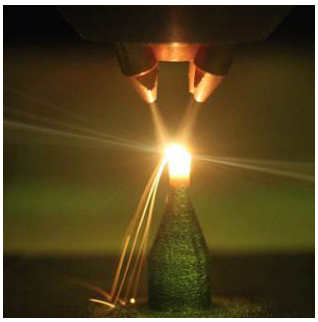
### Seeing and Harnessing Quantum Switching



Scientists at Ames Laboratory are now able to "see" how a new class of photovoltaic materials—organometallic halide perovskites—is able to convert light into electricity. Perovskites are magnificent materials for light harvesting and electronic transport devices, as they combine the best of both worlds—the high-energy conversion performance of traditional inorganic photovoltaic devices, coupled with economical material costs and fabrication methods of organic versions. Ames Laboratory's expertise in precision materials synthesis and exploration, paired with new techniques in laser light terahertz spectroscopy, resulted in being able to directly observe, describe, and quantify a photon-to-exciton event, by which a photon transfers its energy to an electron. Being able to observe and ultimately control this behavior holds significant potential for both advancing photovoltaic technology, and in making new quantum switches for next generation computer architectures and electronic transport devices.

## Technology to Market Highlight

### Revolutionizing 3D Printing Capabilities for Metals



Fine, uniform, high-purity spherical metal powders required to meet the high-tech demands of metals additive manufacturing are made possible through the advanced gas-atomization process developed at Ames Laboratory. This cutting-edge process uses high-pressure gas flow to disperse molten metal and form the powders needed to mass produce complex metallic 3D printed engineering parts at lower cost. Strict control over the powder synthesis provides the ability to control the quality of the final product. Ames Laboratory partnered with industry to meet the manufacturing challenges of printing the distinctive components with specialized metallic alloys and developing production processes and raw material powders to suit industry's specific needs. The resultant technology has been the subject of more than 16 patents over the last two decades and has generated a spin-off company, acquired by Praxair, that produces titanium powder for the manufacturing market.