THE Ames Laboratory

Creating Materials & Energy Solutions

Breakthroughs from the Ames Laboratory

The Ames Laboratory has been changing and improving the lives of Americans for more than 60 years. As this list of Breakthroughs attests, Ames Lab scientific discoveries have led to new technologies that have impacted our lives in many ways.

1 Developed the process to produce high-quality purified materials

Developed the process that enables scientists to produce the purest rare-earth and other materials used in academic and industrial research today.

2 Set the standard for testing tools in analytical laboratories

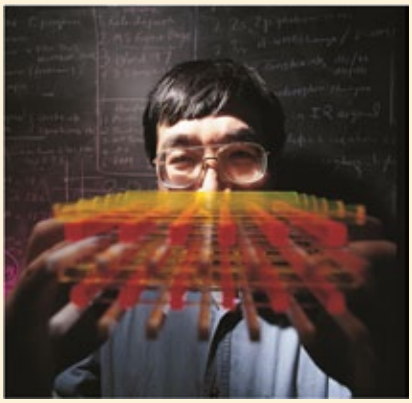
Some 17,000 analytical laboratories worldwide are reaping the benefits of pioneering work in inductively coupled plasma spectroscopy. An analysis tool developed from ICP research enables the rapid and accurate determination of up to 80 elements in metals, alloys and liquids, such as oil, serum, blood and soils. This determination is accurate down to levels of a few parts per trillion.

3 Invented a "smart" material

Scientists developed a novel smart material that has the ability to adapt to outside environmental influences. Terfenol-D is a magnetorestrictive material that converts electrical power to mechanical power and vice versa. The material found its first use in sonar technology for the military but is now used in industrial applications.

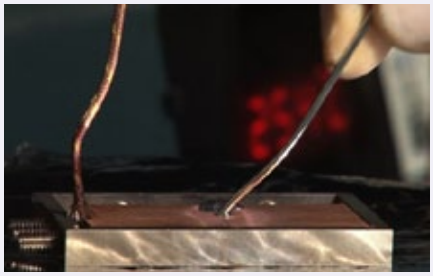
4 More efficient lasers

Scientists designed and demonstrated the existence of photonic bandgap crystals, which make it possible to develop more precise and efficient lasers.



5 Helped get the lead out of the environment

Industry has a new ally in its efforts to remove hazardous lead-based solders from the environment. Our lead-free alloy of tin-silver-copper has been widely adopted by the electronics industry for use in all types of devices, such as computers and cell phones. Lead-free solder has been licensed by more than 60 companies in the United States and around the world.

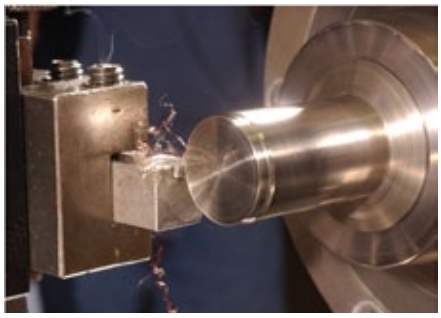


6 Tough glue that makes for stronger bonds in solar arrays

High heat conditions can be the enemy for maintaining strong bonds between ceramic composites used in the fabrication of solar arrays. A process developed for creating tough ceramic glue for joining continuous fiber ceramic composites promotes mechanical bond toughness in solar arrays at operating temperatures of up to 1800 degrees Celsius.

7 BAM, a new nano, tough and super-slick coating

A ceramic coating made from an alloy of boron-aluminum-magnesium (BAM) can be applied to surfaces in industrial hydraulic pumps to reduce friction and increase wear resistance. The result: a potential reduction in U.S. industrial energy usage of 31 trillion BTUs annually by 2030 or a savings of $179 million a year. The coating also has a second application as a friction reducer on industrial cutting tools.

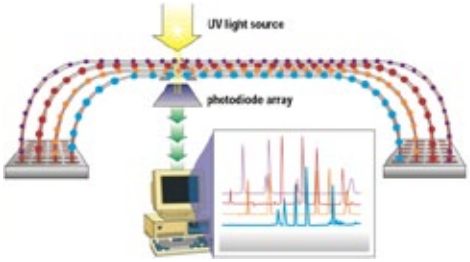


8 Left-handed materials.

Scientists helped create left-handed materials, which exhibit fascinating optical properties not found in naturally occurring materials. This discovery could help scientists create ultrahigh resolution imaging systems, with applications in aerospace, solar power and communications.

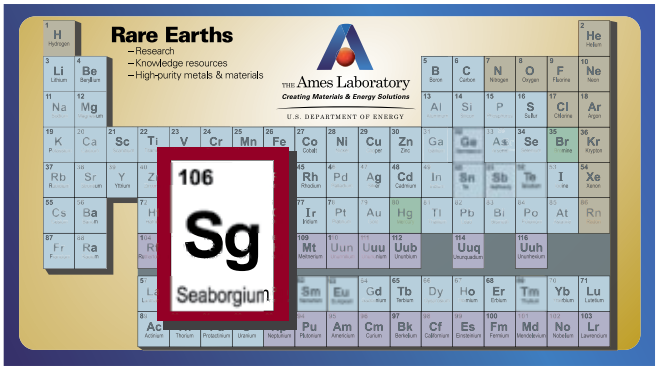
9 The new standard for DNA sequencing

A technique that quantitatively analyzes the chemical content of a single human red blood cell has revolutionized the field of chemical analysis. Multiplexed capillary electrophoresis technology is now the standard analysis tool used for DNA sequencing.



10 Helped chart the elements.

Helped researchers confirm the existence of element 106, seaborgium, a type of primordial plutonium



11 Next-generation refrigeration technology

The next generation of refrigeration technology may get its "cool" from a material and, at the same time, help save the environment. Taking advantage of the magnetocaloric effect, an environmentally benign alloy of gadolinium-silicon-germanium could replace harmful chemical coolants as the cooling method in large supermarket chillers and air conditioners.

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