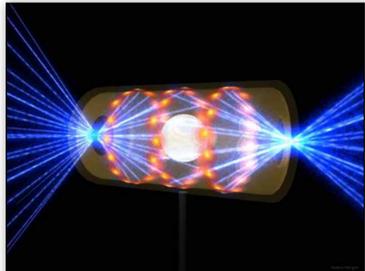


At the National User Facilities, research into natural and man-made energy processes provide opportunities for safer, more efficient energy production.

# ENERGY SCIENCE at National User Facilities

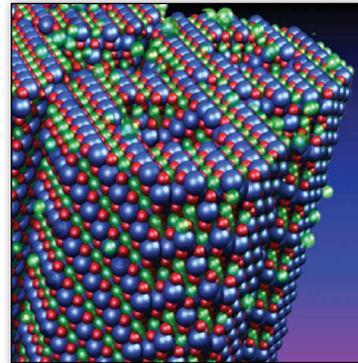
National Ignition Facility



## Inertial Confinement Fusion

NIF's inertial confinement fusion process uses X-ray energy to initiate a fusion reaction and release large amounts of energy. NIF is the first laser fusion facility in which the energy released is planned to exceed that used to initiate the reaction.

Center for Nanoscale Materials



## Batteries Get a Quick Charge with New Anode Technology

New research on rechargeable batteries at the CNM focuses on the transformation of anode materials from amorphous to crystalline. Most known battery materials behave in the opposite fashion: changing from crystalline to amorphous and losing capacity for energy storage. In the new counter-intuitive systems, batteries can be recharged quickly and even boost their power capacity over time.

DOE Joint Genome Institute



## How Now Inside the Cow

One of the challenges associated with developing alternative fuels from plants has been the high cost and energy needed to process plant biomass. Through massive-scale DNA sequencing, DOE JGI researchers recently characterized the genes and genomes of plant-digesting microbes isolated from inside the cow rumen. They are now using this information to improve enzymes for biofuels production to meet our transportation needs.

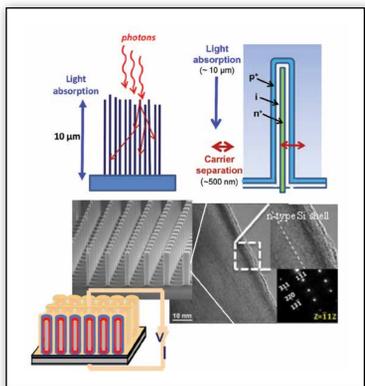
Linac Coherent Light Source



## Catching Photosynthesis in the Act

Photosynthesis may be one of the most important chemical reactions on Earth, yet many aspects of the reaction are not understood. Using the LCLS, researchers are directly observing the natural processes that convert the sun's light into useable energy, with promising implications for America's energy future.

The Center for Integrated Nanotechnologies



## Solar Photovoltaic Nanowires

A collaboration between CINT and Sharp Labs of America is exploring new solar photovoltaic devices based on silicon nanowires. These devices offer the potential for high efficiency at lower cost and greater control of performance, compared with current technologies. This project is providing new insight into the growth of structured nanowires and the fabrication of large nanowire arrays.

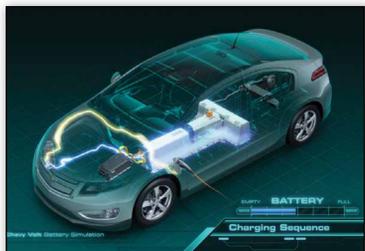
Oak Ridge Leadership Computing Facility



## Optimizing Combustion for Clean Energy

By simulating autoignition and injection processes with alternative fuels, researchers are efficiently optimizing engines, turbines, and other technologies for cleaner energy production. Because a burning flame can manifest chemical properties over a wide range of scales, from billions to thousandths of a meter, the power of Jaguar is necessary to model the entire processes effectively.

Advanced Photon Source



## Our Energy Future

An improved energy future is a major focus of the science at the APS, from improving fuel injector efficiency and clean engine combustion; to aiding in the development of new lithium-ion battery technology; and to studying materials that can provide fuel-efficient and low-cost natural-gas burning turbine engines that will be key to improving and sustaining the future energy grids in the U.S.

National High Magnetic Field Laboratory



## New Materials for Energy

Rare earth minerals offer great potential for the development of high-tech motors, generators, and compressors. Next-generation fuels like algae, along with innovative approaches to energy storage and superconductor development, will reduce carbon dioxide emissions and increase the flexibility of energy use.