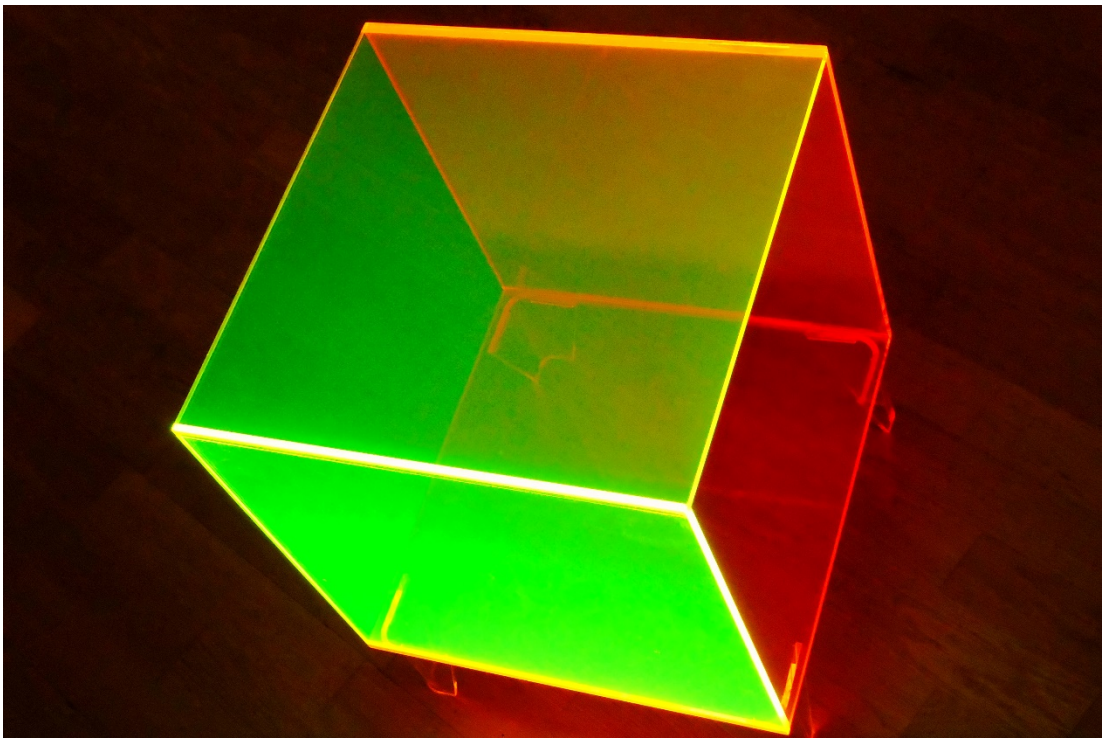
U.S. DEPARTMENT OF ENERGY

Office of Science

COMMUNIQUE

4 March 2019

*Comm*unique provides a biweekly review of recent Office of Science Communications and Public Affairs work, including feature stories, science highlights, social media posts, and more. This is only a sample of our recent work promoting research done at universities, national labs, and user facilities throughout the country.
Please note that some links may expire after time.



A Better Way to Make Acrylics

The global market for acrylic acid is enormous. The world used close to 5 million metric tons of it in 2013. And no wonder, for acrylics and the closely related acrylates are the building blocks for many kinds of plastics, glues, textiles, dyes, paints, and papers. Strung together in long chains, they can make all kinds of useful materials. The current industrial processes for making acrylics require high temperatures and produce unwanted and sometimes harmful byproducts, such as ethylene, carbon dioxide, and hydrogen cyanide. Using a porous catalyst made of manganese and oxygen, University of Connecticut chemist Steve Suib and colleagues at the university and at ExxonMobil have designed a new way of making acrylics at mild temperatures. Their technique can be finely tuned to avoid producing unwanted chemicals. This new process would increase energy efficiency and reduce toxic byproducts.

Click here to read more about the University of Connecticut's work in acrylics.

NEWS CENTER

The Office of Science posted 51 news pieces between 2/19/2019 and 3/3/2019, including 25 university articles and 23 pieces from the labs and user facilities.

Researchers at Berkeley Lab have used the electron counting camera, one of the most advanced microscopes in the world, to reveal the structure of NADH dehydrogenase-like complex (NDH), a large protein complex crucial to photosynthesis. NDH is known to help regulate the phase of photosynthesis where energy from sunlight is captured and stored in cellular energy molecules. This finding will allow future scientists to explore, for the first time, how the complex functions could have implications for the production of a variety of bioproducts, including plastic alternatives and biofuels.

Researchers from Purdue University, Johns Hopkins University, and the University of California at Irvine have determined a method to evaluate how much metal would be required for fuel cell electrodes using the forces on a metal's surface to identify the ideal electrode thickness. Fuel cell electrodes are made of expensive platinum. Cutting down on the platinum would cut costs, allowing more electric cars to hit the market.

Researchers at Argonne National Laboratory and the University of Chicago have invented a way for different types of quantum technology to "talk" to each other using sound waves. It's normally difficult to send quantum information for more than a few microns—the width of a single strand of spider silk—but by using the properties of an electron to code information and then "translating" it via sound waves, scientists believe they can extend control across the length of an entire chip or wafer, an important step in bringing quantum technology closer to reality.

Thanks to a faculty-student research grant, three students from Slippery Rock University are helping scientists at Berkeley Lab discover better ways to use supercomputers. Hired on at the lab as temporary employees, the computing majors are analyzing high performance computers by taking large datasets to predict and prescribe ways to optimize data processing. Their research will help future scientists more easily perform actions in optimal conditions to conserve time and energy, and in ways that more easily detect malicious activity if data is compromised.

Re-analysis of data taken at Jefferson Lab has led to what may be an explanation for the EMC Effect, the discovery that quarks inside nuclei have lower average momenta than predicted. This explanation is based on a model that postulates that, inside a nucleus, many protons and neutrons are behaving

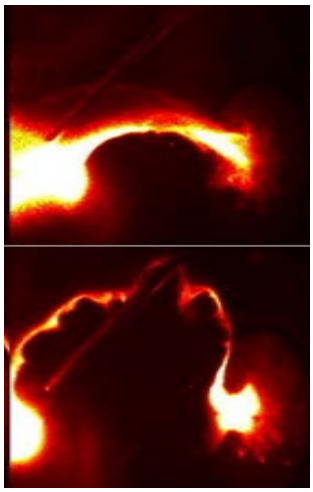
A team of researchers from UC San Diego has reported new findings about perovskites that could pave the way to developing low-cost, high-efficiency solar cells. Using high-intensity X-ray mapping, they explain why adding small amounts of cesium and rubidium salt improves the

as if they are free, while roughly 20 percent are paired-up in a short-range correlation. When protons and neutrons inside the nucleus overlap in these correlated pairs, the quarks have more room to maneuver, therefore moving more slowly than they would in a free proton or neutron.

performance of these solar cell materials. They found that adding low concentrations of these cations caused halide atoms within the material to distribute evenly, resulting in improved stability and up to two percent higher conversion efficiency than perovskites without these additives.

SCIENCE HIGHLIGHTS

The Office of Science posted 18 highlights between 2/19/2019 and 3/3/2019 spotlighting science from four programs: FES, NP, BES, and BER.



While the great majority of electrons in a cold plasma collide before they can accelerate to high energy, it's possible that a lucky few don't, leading to an intense X-ray burst. Scientists from the California Institute of Technology observed such a burst of X-rays from a laboratory plasma jet. The team's discovery of how these microsecond X-ray bursts form shows detailed collision statistics are important when dealing with cold plasmas.

Zirconium-89 is a radionuclide that's just right for cancer tumor imaging. When combined with a tumor-seeking molecule, it lasts long enough in the body to find the tumor and to be imaged. Researchers developed a more efficient way to chemically process and purify the isotope. This work, supported by the DOE Isotope Program, shows that zirconium-89 can be produced on lower energy cyclotrons with a

simple target design. The new automated approach could make high-quality batches more available and reduce exposure for radiation workers.

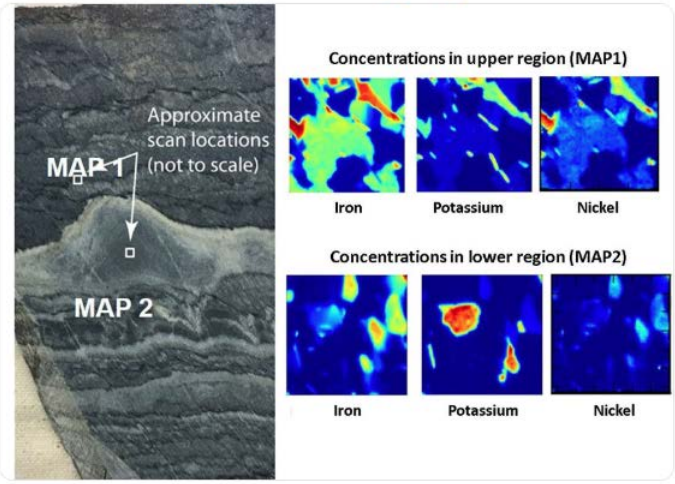
Wind gusts beneath rainstorms over the ocean cause more water to evaporate from the ocean's surface. A team led by scientists from Pacific Northwest National Laboratory found that this additional evaporation is an important energy source for tropical circulations that then create rainfall. In the northern Tropical West Pacific, a region with very strong rainfall and weak surface winds, summertime precipitation is often underestimated in Earth system models. This work will help make such models more accurate by adding in surface wind gusts under rainstorms over the ocean.

TOP TWEETS

The Office of Science sent out 60 tweets between 2/19/2019 and 3/3/2019 and gained 201 new followers.

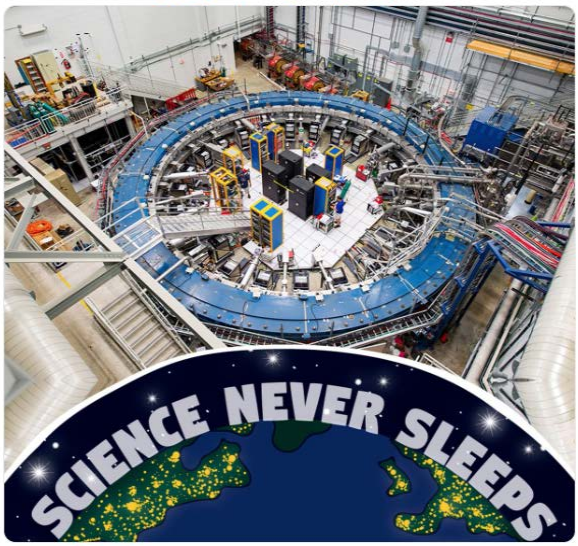
DOE Science ✓
@doescience

#ICYMI 3.7-billion-year-old rock structures formed by tectonics, not life #NSLSII @BrookhavenLab science.energy.gov/bes/highlights ...



DOE Science ✓
@doescience

How much does a #muon wobble? Precise predictions @Fermilab & @BrookhavenLab show swaying of subatomic particle electrons might change reigning theory of how universe works @PhysRevLett #ScienceNeverSleeps science.energy.gov/hep/highlights ...



BY THE NUMBERS

The Department of Energy's EurekAlert! Portal

In Fiscal Year 2018, OCPA posted 500 news releases and feature stories to EurekAlert! and had 78,674 views of that content. EurekAlert! is a third-party news aggregator where OCPA posts our own releases and feature articles, national laboratory news releases and feature articles, and collects and promotes relevant news from universities. We use EurekAlert! to reach audiences where they already exist, rather than expecting reporters and others who are interested to simply find us. With a broad readership from major science reporters, posting to EurekAlert! helps us better amplify research supported by the Office of Science.

END NOTES

SULI Interns at PNNL

The Science Undergraduate Laboratory Internship (SULI) program encourages undergraduate students and recent graduates to pursue science, technology, engineering, and mathematics careers by providing research experiences at DOE laboratories. As interns, they perform research—under the guidance of laboratory staff scientists or engineers—on projects supporting the DOE mission.

Pacific Northwest National Laboratory, one of the facilities that hosts SULI interns, has posted a video series highlighting some of the work that these interns, like Tommy Lam, do at the labs and the impact of their time at the labs on them professionally and personally. While participating in the SULI program, Tommy Lam sought to help understand the properties of particles that make up the universe. As an intern at Pacific Northwest National Laboratory, he analyzed data from the Belle II high energy physics experiments.

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No. 10: 4 March 2019