U.S. DEPARTMENT OF ENERGY

Office of Science

COMMUNIQUE

15 October 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.*

Fossils and Folios: How the same technique helped reveal both a 6th century medical text and an ancient bird feather's pigment

The feathered edges of an 11th century book of hymns fan out as a researcher carefully opens it. The delicate pages, treated with extreme care, hide a secret only revealed with X-ray light. Beneath the hymns lie an even older book of medical care, written by physician and philosopher Galen of Pergamon. The underlying text dates to the 6th century.

It's the 11th century and parchment is very expensive. A common practice at the time reused older books by scraping their pages clean and writing new material on them. Galen's book on medicine succumbed to this fate. An X-ray source at SLAC National Accelerator Lab (SLAC) revealed these hidden lines, using a technique that has also revealed the pigment of an ancient bird feather.

Click here to read more about the technique at SLAC that ties together fossilized bird feathers and a 6th century medical text.

NEWS CENTER

The Office of Science posted 60 news pieces between 9/30/2019 and 10/13/2019, including 32 university articles and 21 pieces from the labs and user facilities.

Researchers at Stanford University and SLAC National Accelerator Laboratory have found the first, long-sought proof that a decades-old scientific model of material behavior can be used to simulate and understand high-temperature superconductivity -– an important step toward producing and controlling this puzzling phenomenon at will. These simulations suggest that researchers might be able to toggle superconductivity on and off by tweaking a material's chemistry so electrons hop from atom to atom in a particular pattern.

Researchers at Oak Ridge National Laboratory have performed experiments in a materials testing facility to develop a method that uses microwaves to raise plasma's temperature closer to the extreme values reached in a fusion energy reactor's exhaust system. This method helps raise plasma's temperature to temperatures similar to what is expected in ITER.

Argonne National Laboratory has become the newest member of the Accelerating Therapeutics for Opportunities in Medicine consortium. Working in this partnership, scientists at Argonne will use artificial intelligence to transform the existing drug discovery process into a rapid, integrated, patient-centric model.

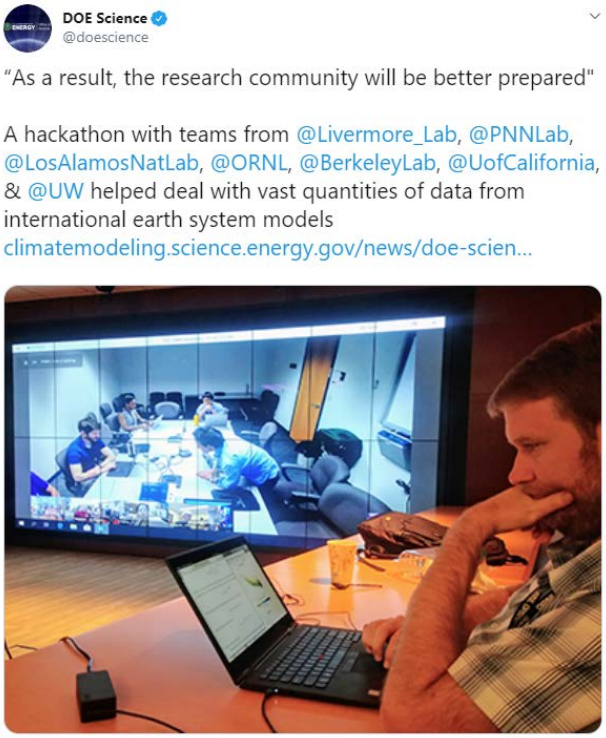
UC Davis's Crocker Nuclear Laboratory has received a $340,000 grant from the Department of Energy to manufacture astatine-211 for medical use. The rare isotope shows promise as a tumor-killing treatment for some cancers, but is currently not available in large enough amounts for clinical testing. Using the cyclotron at the Crocker Laboratory, UC Davis scientists will bombard bismuth-209 with alpha particles to produce astatine-211.

Penn State researchers have proposed a biochemical pathway to explain how a methanogen important to the carbon cycle uses iron to capture energy when producing methane. An understanding of how this microorganism creates methane and carbon dioxide may allow future researchers to manipulate the amount of these greenhouse gases that escape into the atmosphere.

Researchers from the University of Rochester and Purdue University have demonstrated a method of relaying information by transferring the state of electrons. This research brings scientists one step closer to better understanding quantum behavior and creating fully functional quantum computers.

TOP TWEETS

The Office of Science sent out 51 tweets between 9/30/2019 and 10/13/2019. Here are our two most popular from the past two weeks:



BY THE NUMBERS

The Department of Energy's Office of Scientific and Technical Information (OSTI) has 404,622 journal articles, videos, and other documents relating to lithium-ion batteries, the discovery that made mobile phones, laptops, and electric cars possible, created viable renewable energy storage options, and earned M. Stanley Whittingham, director of the NECCES EFRC, and John Goodenough, winner of a 2009 Fermi Award, the 2019 Nobel Prize in Chemistry. These documents—which include 7,340 patents, 54 pieces of software, and 142,109 technical reports—were all informed by Whittingham, Goodenough, and Akira Yoshino's work in the development of lithium-ion batteries, a breakthrough that laid the foundation for future sustainable technology and revolutionized electronics and energy storage.

END NOTES

Video: Excellence in Accelerators

Berkeley Lab's accelerators have enabled new explorations of the atomic nucleus; permitted the production and discovery of new elements and isotopes, and of subatomic particles and their properties; created new types of medical imaging and treatments; and provided new insight into the nature of matter and energy, along with new methods to advance industry and security, among other wide-ranging applications. Berkeley Lab scientists have also pioneered a framework for designing, building, and operating these machines of big science with multidisciplinary teams. The lab's longstanding expertise is now driving a new generation of innovations in advanced accelerators and their components.

This format is not compatible with forwarding. If you would like to forward this message, please use the attached PDF copy.

No. 21: 15 October 2019