



ACCOMPLISHMENTS

Q1 FY22



U.S. DEPARTMENT OF
ENERGY

NETL ACCOMPLISHMENTS

Quarter 1 – Fiscal Year 2022

NETL'S NOR FARIDA HARUN RECOGNIZED AT 2021 WOMEN OF COLOR IN STEM CONFERENCE

NETL research scientist Nor Farida Harun, Ph.D., received a Special Recognition Award for her work toward developing a smart electrical grid during the Women of Color (WOC) in STEM Conference — Digital Twin Experience (DTX), held in a virtual setting Oct. 7-9. The theme for WOC DTX 2021, “Reset to Rise: It’s a New Day!” reflected the global push to overcome the challenges of 2021 and move forward. For more than two decades, awards presented at this leading conference served the dual purpose of showcasing outstanding achievements in science, technology, engineering and mathematics (STEM) and highlighting the significant barriers for women in the workforce. Harun, who was selected as being among an extraordinary group of forward-thinking people in STEM, has published 29 papers in her career and nine in a single year. NETL has leveraged her expertise in the submission of six proposals in the last year, four of which were funded for a total of \$5.2 million.



NETL'S ENERGY DATA EXCHANGE CELEBRATED 10 YEARS OF EXCELLENCE

The Energy Data eXchange (EDX), an NETL-developed virtual library and data laboratory built to advance fossil energy and environmental research and development, celebrated its 10th anniversary. The virtual tool has seen wide success since its inception and is in a prime position to support the artificial intelligence and machine learning big data revolution currently underway. Developed in 2011, EDX is the only DOE platform tailored to support research from start to finish. Throughout the decade, data hosted and utilized on EDX has supported NETL's Oil and Gas Program and Carbon Storage Program, as well as many other vital energy research areas. EDX data has been used to inform decisions surrounding the prevention of environmental and social risks of offshore drilling, preventing infrastructure failures in oil wells, informing a variety of decarbonization efforts in the U.S. and more. Users have uploaded hundreds of terabytes of data and downloaded nearly 1.2 million files (14 petabytes) to drive innovative energy research. EDX currently hosts hundreds of thousands of combined public and private resources.

NETL RESEARCHERS EARNED PRESTIGIOUS R&D 100 AWARD FOR SORBENT TECHNOLOGY

The NETL research team behind the development of Multi-functional Sorbent Technology (MUST) earned a prestigious R&D 100 Award for the game-changing suite of low-cost, versatile sorbents that is highly effective in cleaning contaminated waterways and removing metals from electronic and pharmaceutical production processes. MUST offers a practical, affordable and green approach to recover critical materials such as aluminum, cobalt and rare earth elements and removes the threat of selenium, lead and other heavy metals that contaminate water supplies. The MUST team, which was named a winner in the Mechanical/Materials category during a virtual awards ceremony held Wednesday, Oct. 20, was led by NETL's McMahan Gray, a physical scientist. Other team members were Walter Wilfong, Qiuming Wang, Fan Shi, Tuo Ji, Thomas Tarka, Nicholas Siefert and Brian Kail. The R&D 100 Awards competition annually recognizes 100 winning products and technologies as the disruptors that will change industries and make the world a better place in the coming years.

NETL RESEARCHERS HONORED WITH DOE SECRETARY'S HONOR AWARDS

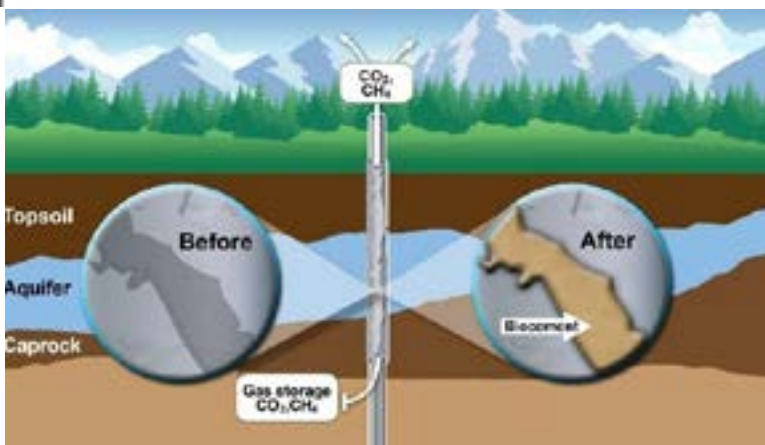
Three DOE Secretary's Honor Awards were presented to NETL. Christina Lopano, Ph.D., research physical scientist, received the Secretary of Energy's Excellence Award, which is bestowed on individuals who have achieved a singular accomplishment that demonstrates a high level of performance and outstanding leadership in public service. Lopano's research is advancing efforts to end reliance on offshore suppliers and to establish a reliable domestic source of rare earth elements and critical minerals, which are needed to manufacture valuable consumer products such as computer hard drives as well as medical equipment, energy components and defense systems. NETL's Energy Data eXchange (EDX) Development and Operations Team received the Secretary of Energy's Achievement Award. By providing a platform from which data from more than 20,000 research projects can be accessed, EDX has helped streamline R&D projects that will address some of the greatest energy, environmental and technological challenges of the 21st century. NETL's MUST Team also received the Secretary of Energy's Achievement Award. The team developed a suite of sorbents that offers a practical, affordable and green approach to remove selenium and other metals that contaminate water supplies across America and jeopardize the health of millions of people, wildlife and fragile ecosystems.

AICHE RECOGNIZED NETL'S SOFIANE BENYAHIA FOR COMPUTATIONAL PREDICTIVE RESEARCH CONTRIBUTIONS

The Particle Technology Forum of the American Institute of Chemical Engineers (AIChE) selected NETL Senior Researcher Sofiane Benyahia, Ph.D., to receive the prestigious Lectureship in Fluidization Award during the 2021 AIChE annual meeting. This award recognizes an individual's outstanding scientific/technical research contributions with impact in the field of fluidization and fluid-particle flow systems. Benyahia has more than 20 years of experience conducting computational fluid dynamics simulations of multiphase flows resulting in more than 40 peer-reviewed publications. His research focuses on developing computationally efficient and physically accurate models to better understand, predict and troubleshoot systems at the heart of the chemical and energy industries. In addition to the awards ceremony, Benyahia gave a plenary presentation during the AIChE annual meeting in Boston.

NETL-INDUSTRY PARTNERSHIP ACCELERATED TRANSITION TO LOWER-CARBON WORLD

Svante Inc. rapidly scaled up a new sorbent and intensified process technology to capture carbon dioxide (CO₂), a greenhouse gas, from power generation and industrial point sources that could significantly lower the capital investment needed to develop carbon capture plants at gigaton scale. Svante offers companies in difficult-to-abate industries, such as those that produce cement, hydrogen, chemicals, pulp and paper, an engineered solution to rapidly capture CO₂ with a unique filter made from nanomaterials called structured adsorbents. Captured CO₂ can then be stored permanently in the subsurface or reused as a feedstock for high-value chemicals and other applications. The technology can capture up to 95% of CO₂ emitted from power generation and industrial sources using novel solid sorbent materials that act as a sponge for adsorbing CO₂. Low-pressure steam is introduced to release the CO₂ from the filter, allowing the sorbent materials to rapidly regenerate and repeat the capture process.



NETL PARTNERS COMMERCIALIZED BIO-CEMENT TECHNOLOGY TO REDUCE GREENHOUSE GAS EMISSIONS

Bioengineering technology developed by university and industry partners with NETL oversight has been used to plug more than 40 wells across the U.S. Now licensed as a commercial product, the technology uses microbes to initiate a process to help seal problematic defects in wellbore casing cement. The technology is poised to become an important tool in the Biden Administration's plan to seal orphaned oil and gas wells and prevent leakages of methane, a potent greenhouse gas, into the atmosphere and underground water supplies. NETL's collaboration with the Montana State University Energy Research Institute and Center for Biofilm Engineering, Montana Emergent Technologies (now BioSqueeze Inc.) and others began in 2014 to develop the technology.



NETL SIGNED MEMORANDUM OF UNDERSTANDING WITH OREGON MANUFACTURING INNOVATION CENTER

NETL entered a memorandum of understanding with the Oregon Manufacturing Innovation Center for Research and Development (OMIC R&D) to coordinate the development of new alloys and materials technologies for use in manufacturing applications. This agreement united the activities of the two organizations and plays to the strengths of their unique, complementary research capabilities. NETL has expertise in materials development, alloy development, prototype alloy manufacturing (based on ingot metallurgy), characterization and performance under simulated service conditions and life-cycle modeling. OMIC R&D has experience and expertise in subtractive and additive manufacturing, and it has real-world experience in materials performance as it pertains to machining, machinability and service application. Leveraging capabilities of NETL and OMIC R&D will support the acceleration of technology innovation, solutions and entrepreneurship for an expanding and robust advanced alloy and manufacturing supply chain comprised of startups, small and large businesses to benefit Oregon and the entire nation.

NETL HELPED MOVE ADVANCED MAGNETIC TECHNOLOGIES TOWARD COMMERCIALIZATION

Advanced magnetics technologies developed at NETL and Carnegie Mellon University (CMU) were licensed to Pittsburgh-based startup CorePower Magnetics Inc. The inventions could provide multiple benefits to the American people, from power generation to transportation and beyond, and have potential application in energy and electric vehicle manufacturing. The technology license covered a broad portfolio of soft magnetics technologies developed by teams led by CMU's Michael McHenry Ph.D., co-founder and chief scientist of CorePower Magnetics, and University of Pittsburgh's Paul Ohodnicki Ph.D., co-founder and chief technology officer of CorePower Magnetics and former NETL researcher. This combination of novel magnetic materials and advanced manufacturing techniques enable a level of control in magnetics engineering not currently available.



NETL'S MARY ANNE ALVIN NOMINATED AS A 2021-2022 SOCIETY FOR MINING, METALLURGY & EXPLORATION HENRY KRUMB LECTURER FOR RARE EARTH ELEMENT RESEARCH

NETL Acting Technology Manager for DOE's Office of Fossil Energy and Carbon Management Critical Minerals Sustainability Program accepted a nomination from the Society for Mining, Metallurgy & Exploration (SME) as Henry Krumb Lecturer for her paper titled "Rare Earth Elements (REEs) and Critical Minerals (CMs)." Alvin is a nationally renowned expert who is internationally recognized in the areas of REEs and CMs, which are vital to the increasingly high-tech economies of the modern world. During the 2022 Henry Krumb Lecture Series, Alvin will detail NETL's research project portfolio to SME members. By finding unconventional sources of REEs and CMs close to home, developing advanced separation and recovery processing circuits, and facilitating the construction and operation of pilot-scale test facilities, Alvin and NETL are helping to incentivize environmental cleanup, create new job opportunities and promote potential future onshore domestic REE and CM production.



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