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UNH Researchers Discover New Materials to Generate Solar Fuel Production

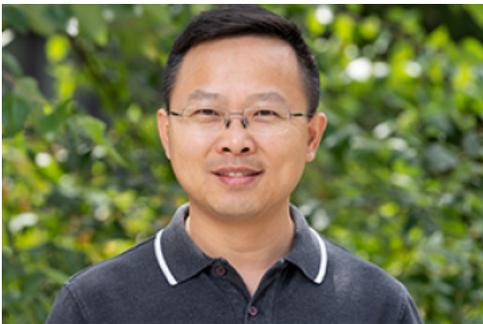
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(HTTPS://WWW.UNH.EDU/UNHTODAY/NEWS/RESEARCHERS-DISCOVER-NEW-MATERIALS-TO-GENERATE-SOLAR-FUEL-PRODUCTION)

DURHAM, N.H. – Researchers at the University of New Hampshire have identified new, readily available materials that convert sunlight and carbon dioxide (CO2) into building blocks for liquid fuels that could one day heat homes and power cars.

“Currently we can convert sunlight into electricity using solar panels on homes and other buildings,” said Gonghu Li, associate professor in chemistry and materials science. “However, electricity isn’t easy to store on a large scale, and energy production stops when the sun goes down. We wanted to look for something that had more staying power.”

In their study (<https://pubs.acs.org/doi/10.1021/jacs.8b10380>), recently published in the *Journal of*



GONGHU LI, UNH ASSOCIATE PROFESSOR IN CHEMISTRY AND MATERIALS SCIENCE, AND A TEAM OF RESEARCHERS HAVE IDENTIFIED NEW, READILY AVAILABLE MATERIALS THAT CONVERT SUNLIGHT AND CARBON DIOXIDE (CO2) INTO BUILDING BLOCKS FOR LIQUID FUELS THAT COULD ONE DAY HEAT HOMES AND POWER CARS. CREDIT: DAVID VOGT, UNH.

the American Chemical Society, the researchers outline a promising approach for recycling CO2 by replicating a process found in green plants called photosynthesis – an energy conversion process that uses sunlight. Taking a cue from the plants, the researchers focused their research on developing new materials to harvest natural sunlight and break down chemical bonds in CO2.

The process is often referred to as ‘artificial photosynthesis’ because it mimics the fuel forming reaction carried out in plants. The challenge was to make materials based on elements that are abundant on Earth, and not scarce or expensive like platinum.

One key ingredient required to break the bonds of CO2 is a supply of electrons. These electrons can be generated when a material known as a semiconductor gets activated by energy in the form of sunlight. The researchers decided on a metal-free semiconductor made from commercially available urea to harvest the sunlight and power the right chemical reactions which can transform CO2, a greenhouse gas, into simpler parts including carbon monoxide that is a building block for creating useful chemicals and fuels.

The researchers teamed up with scientists at Brookhaven National Laboratory to access the National Synchrotron Light Source II, a U.S. Department of Energy (DOE) Office of Science user facility, to reveal how the new materials perform so well in this process. This research is based upon work supported by the U.S. DOE and the U.S. National Science Foundation.

The University of New Hampshire is a flagship research university that inspires innovation and transforms lives in our state, nation and world. More than 16,000 students from all 50 states and 71 countries engage with an award-winning faculty in top ranked programs in business, engineering, law, health and human services, liberal arts and the sciences across more than 200 programs of study. UNH’s research portfolio includes partnerships with NASA, NOAA, NSF and NIH, receiving more than \$100 million in competitive external funding every year to further explore and define the frontiers of land, sea and space.

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