UMass Lowell researchers are working to harness the power of photosynthesis in the lab; the results could help address the world’s energy needs. The U.S. Department of Energy was encouraged enough by early efforts to award $3 million to UMass Lowell and two other universities working on the project.

The three-year study is funded by the Department of Energy’s Advanced Research Projects Agency for Energy (ARPA-E), which seeks out “transformational, breakthrough technologies that show fundamental technical promise but are too early for private-sector investment.”

Researchers from UMass Lowell, UMass Boston and the University of Wisconsin–Madison will work to develop a metal catalyst for converting sunlight, carbon dioxide (CO₂) and water into hydrocarbon fuel.

The team is applying the principle of photosynthesis—the process by which plants, algae and many forms of bacteria use energy from sunlight to convert CO₂ and water into organic compounds while releasing oxygen as byproduct—to produce the hydrocarbon fuel in the laboratory.

The researchers use nano-optics and catalyst materials to convert carbon dioxide and water directly into hydrocarbon compounds.

“Waste carbon dioxide is an enormous resource, representing more than 200 million metric tons per year,” says physics Assoc. Prof. Mengyan Shen, head of UMass Lowell’s Laboratory for Nanoscience and Laser Applications and principal investigator for the project. “Converting it to liquid hydrocarbon fuel will decrease our carbon footprint and reduce the nation’s dependence on petroleum.”

The discovery was made by Shen’s lab at UMass Lowell. Last summer, his team received a three-year grant from the National Science Foundation (NSF) worth nearly $417,000 to improve the process.

“The goal of our NSF grant is to study the basic mechanism while the ARPA-E award is to develop the technology for commercialization,” explains Shen.

Researchers at UMass Boston will help with optical engineering, and researchers at the University of Wisconsin–Madison will lead the chemical engineering effort.

Says Shen: “This is an exciting opportunity. Lowell is the cradle of the American Industrial Revolution, and we want to be part of the next-generation of alternative energy.”
prof’s immersion in ‘wild west’ antiques world results in book

maureen stanton wins massachusetts book award in nonfiction

english assoc. prof. maureen stanton visited an antique auction to catch up with a friend, but found a research project. several years later, she’s won the massachusetts book award in nonfiction for “killer stuff and tons of money: an insider’s look at the world of flea markets, antiques and collecting.”

stonant’s book is “a journey through a subculture.” she uses literary journalism—applying literary techniques to nonfiction—to explore the world of antiquing from flea markets to high-end auctions.

her characters are dealers, collectors and auctioneers. the plot follows her college friend as he buys and sells his way up the antiques ladder, always looking for the “retirement piece” to fill his bank account. stanton and the reader learn bits of history, helping them appreciate the items as they cheer on her friend’s work.

“I like vintage clothing and have frequented antique stores, but didn’t really have the history part in mind. Writing the book has made me a huge fan,” stanton says. “I see an object and want to know more about it and its creator or owner.”

“It’s an especially interesting time because Baby Boomers are inheriting items from their parents and don’t know what they are,” says stanton. “Others do and pick up the items. It’s fun because it’s like the Wild West, almost an unregulated economy.”

study will explore how solar storms affect earth’s atmosphere

We all rely on local weather forecasts to plan our travels and outdoor activities, or even to decide whether to water the lawn.

But researchers like prof. paul song in umass lowell’s department of physics & applied physics are also interested in “space weather,” the constantly changing environmental conditions in interplanetary space, especially between the sun’s atmosphere and earth’s outer atmosphere.

“Predicting space weather is the next frontier in weather forecasting,” says song, who directs umass lowell’s center for atmospheric research.

“Inclement space weather has increasingly become a threat to modern space technologies and services, such as gps, shortwave radio and satellite communications,” says song.

NASA funds umass lowell research on space weather

Prof. Paul Song is director of umass lowell’s center for atmospheric research, one of the pioneers in the national space-weather research program and a leader in the study of magnetosphere-ionosphere interactions.

While large space-weather events, known as space storms or solar storms, can trigger spectacular displays of auroras, the high-energy particles produced by these storms can harm the health of spacewalking astronauts as well as airline passengers and crews flying at high altitudes along polar routes.

Solar storms start out with coronal mass ejections, or CMEs, which are enormous bubbles of plasma flowing out from the sun.

“CMEs travel through interplanetary space and eventually hit earth, potentially affecting our lives and those of orbiting satellites,” says song. “The effects we feel on the earth depend on how the interactions take place between a CME and earth’s magnetosphere, a region well above the atmosphere where most satellites fly, and the ionosphere, which is roughly the top of the atmosphere.”

Song, together with prof. vytenis vasyliunas and AssT. Research Prof. Jiannan Tu, recently received a three-year grant from NASA worth more than $356,000 to study these interactions.

education profs partner with lawrence schools

project targeting english language learners gets $1.6 million grant

For lawrence middle school teacher Kimberly Rodriguez, learning about her students’ personal histories changed her approach in the classroom.

Understanding the challenges facing students and their families, many of whom are not native English speakers, helped Rodriguez forge connections with students and open up communication with parents.

Rodriguez used strategies she learned in a pilot project led by umass lowell’s graduate school of education (gse) assoc. prof. michaela colombo. a partnership between the gse, the lawrence schools and the massachusetts department of elementary and secondary education, the project’s goal was to improve classroom instruction for students learning the English language. More than 40 staff members of the lawrence school district participated in the training and professional development program, with 36 earning a certificate from umass lowell in teaching English language learners (ELLS).

“It was eye-opening,” Rodriguez says. “I wanted to get a better understanding of my students. knowing each student’s story helps me reach them.”

Now, the project is expanding, thanks to a $1.6 million grant from the U.S. Department of Education. The five-year grant will fund additional teacher training and professional development, with a focus on science, technology, engineering and math disciplines.

As part of the project, the gse is incorporating ELL training into its curriculum to prepare new teachers. one component of the program is training teachers how to increase family and community engagement with the school.

laurie hartwick, a high school teacher in lawrence, talked to graduate education students in assoc. prof. michaela colombo’s class about strategies for teaching English language learners.

study funds umass lowell research on space weather

Prof’s Immersion in ‘Wild West’ Antiques World Results in Book

Maureen Stanton Wins Massachusetts Book Award in Nonfiction

English Assoc. Prof. Maureen Stanton visited an antique auction to catch up with a friend, but found a research project. Several years later, she’s won the Massachusetts Book Award in nonfiction for “Killer Stuff and Tons of Money: An Insider’s Look at the World of Flea Markets, Antiques and Collecting.”

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Ratcliffe Shares Experiences from High-Tech Finance

In a lively talk at the Manning School of Business recently, University graduate Ken Ratcliffe, ’71, shared stories about his four-decade career in executive finance at Fortune 500 companies like Apple, Digital Equipment Corp. and Data General. He had returned to campus for the first time in 40 years as the featured guest of the Robert J. Manning Speaker Series.

Quoting Steve Jobs, Winston Churchill, Wayne Gretsky and Sam Kinison, Ratcliffe offered students advice on life and careers. A key to success in all ventures, he said, is self-awareness. “If you’re a rabbit, go for it. If you are a turtle, be the most competent turtle in the pond,” he said.

He told students to be disciplined, to take risks and build confidence through achievement. A key to long-term success, he stressed, is having the resiliency to rebound from the inevitable setbacks that occur in every career.

Ratcliffe urged students to be uncompromising in matters of integrity and to take care protecting their “personal brands,” which can be destroyed in an instant, especially through carelessness with social media.

Study Funded by $1.3M Grant From National Institutes of Health

A non-surgical, minimally invasive light therapy under study at UMass Lowell, in collaboration with Massachusetts General Hospital and Harvard Medical School, could someday help patients fight viruses, bacteria, fungi and cancer cells.

The project, led by Prof. Long Chiang of UMass Lowell’s Chemistry Department and Prof. Mike Hamblin of Wellman Center for Photomedicine at Mass General Hospital, is funded by a four-year, $1.34 million award from the National Institutes of Health.

Called “photodynamic therapy,” or PDT, the technique combines a photosensitizer—a non-toxic, light-sensitive agent functioning as a catalyst—with harmless visible light to produce a photochemical reaction in the presence of oxygen that could wipe out cancer cells and other harmful microorganisms.

The photosensitizer is first administered, followed by the irradiation of the tumor or infected tissue with intense light from a powerful lamp or laser. The photosensitizer absorbs the therapeutic light to form free radicals and singlet oxygen. These reactive oxygen species can kill cancer cells and pathogenic bacteria, fungi and viruses directly or by activating the host’s immune system.

Chiang and his team are using chemically modified carbon molecules—called “fullerenes”—as photosensitizers.

“Several in vitro studies have shown that cancer cells, such as the human cervical carcinoma, as well as gram-positive and gram-negative bacteria and fungal cells can be killed with fullerene-mediated PDT,” explains Chiang. “Viruses can also be inactivated.”

Researchers Use Nanotechnology, Light to Fight Cancer Cells

Nursing Diversity to Nursing Program Welcomes New Students

Nurses who are able to effectively interact with patients across cultures and ethnic backgrounds deliver the best care to patients by alleviating fears about treatment and care, experts say.

UMass Lowell’s Bring Diversity to Nursing (BDN) program is a powerful way to attract, retain and graduate nurses who can work in the community to reduce disparities of care and improve outcomes. Students enrolled in the program receive support such as scholarships, stipends, technology equipment, tutoring, mentoring and leadership opportunities—all designed to help them graduate and work in local communities.

At a recent event, nursing faculty and administrators welcomed 32 students to the program.

The program, now in its fifth year, has graduated 28 students with four more graduating this fall. All who have graduated have passed the national license exam for registered nurses.

The BDN program is funded by the U.S. Department of Health and Human Services, Health Resources and Services Administration and the Massachusetts Department of Public Health.

Raising awareness of nursing as a career with elementary, middle and high school students is a critical component of the Bring Diversity to Nursing program. The project team conducts workshops at Lawrence and Lowell public schools and the Lawrence Branch of the Merrimack Valley YMCA.
Winter Teams Playing Strong

The River Hawks haven’t cooled off in the winter season. With scores climbing and school records falling, the teams are on fire in the rink, on the court and on the track.

On the Ice

The men’s ice hockey team has vaulted onto the national stage, tallying the longest winning streak in Hockey East and toppling high-ranking opponents, including Northeastern and Boston University. Their home ice win over Providence College was broadcast on NBC Sports Network, allowing alumni and new fans across the country a view at their success.

“When good things are happening, there’s a domino effect; the same as when we were losing close games at the beginning of the year,” says head coach Norm Bazin ’94, ’99. “But, I think the hockey gods have their way of evening things out at times.”

Accolades have been numerous for the team. Freshman goaltender Connor Hellebuyck’s impressive work has earned him several awards this season, including Hockey East’s Defensive Player of the Month for December. The Winnipeg Jets draft pick has shut out several opponents, leading a strong class of first-year players.

The men’s hockey team has had some extra guidance this season, with NHL goaltender Dwayne Roloson ’94 volunteering during several practices while waiting for the NHL lockout to end. Roloson, who worked with Bazin as a River Hawk before goaltending professionally, helped players on and off the ice, discussing life as a professional athlete and how to get past a goaltender.

On the Court

On the basketball court, Bianca Simmons is pushing the women’s team to new heights. Named Player of the Week more often than not this season and chasing the University’s career scoring record, Simmons will attend the WNBA’s Free Agent Camp in April. The senior guard is also leading the nation in Division II scoring, averaging more than 25 points a game.

“Shes one of the best players around at any level,” head coach Sarah Behn says.

The second half of the River Hawks’ winning combination this season is Ashley Rivera, a senior point guard transfer who has quickly found a groove with Simmons. Rivera’s filling of Simmons’ old position has freed the guard up to assist, rebound and score much more this season.

While the men’s team has struggled to hit its stride this season, recent events have spurred them to action. The team celebrated head coach Greg Herenda’s 100th win in January, making him the most successful coach in the program’s history. Later in the month, legendary college basketball coach Jim Calhoun visited the players, giving tips from his long career and guidance toward a strong season.

On the Track

Excitement has hit the track as the men’s and women’s team came back from winter vacation ready to break records. Senior Eric McDonald ran the fastest mile in Division II early in the season and promptly beat his own record the next week.

Junior Candace Greene climbed the shot-put rankings while several teammates qualified for NCAA championships early in the season. Both McDonald and Greene earned honors in the conference as the teams rack up points at meets.

River Hawks Raise the Athletic Bar