

UW-Madison: Sustainable chemical engineering research wins Marcel Schreier Packard Fellowship

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MADISON — Marcel Schreier, who develops electrocatalytic pathways to transform chemicals and make fuels using clean electricity, is one of 20 early-career scientists from across the United States named a Packard Fellow for Science and Engineering.

Schreier, the Richard H. Soit Assistant Professor in chemical and biological engineering and affiliate faculty in chemistry at the University of Wisconsin-Madison, will receive a grant of \$875,000 over five years. Packard Fellows can use the funding to explore high-risk aspects of their work in search of the sort of high-reward discoveries that expand the frontiers of their field.

“Each of the Fellows in this year’s class is exceptional, and we’re excited to support them as they push the boundaries of discovery and innovation in their fields,” says Richard Alley, chair of the Packard Fellowships for Science & Engineering Advisory Panel, and a 1991 Packard Fellow. “We welcome them to the community of Packard Fellows and look forward to learning from them and helping them advance the frontiers of science and engineering for the good of all of us.”

Schreier’s lab focuses on electrocatalysis, developing methods to transform chemicals using electricity. Most industrial chemical processes rely heavily on fossil fuels to produce chemicals, for instance converting petroleum into plastics, gasoline and other products. Schreier is interested in developing ways of using electricity, which can be sourced from renewable resources like wind and solar, to power these chemical conversions in a more sustainable way to achieve a circular economy with net-zero carbon emissions.

“The chemical industry makes everything that surrounds us — paints, lubricants, coatings, plastics. It really makes our modern life possible,” says Schreier. “All these chemical products are being produced currently by burning fossil fuels. At the same time, we have an increasing amount of renewable energy in the form of electricity. We are investigating two things: how we can use electricity to drive chemical reactions that allow us to make chemical products more sustainably and how to store renewable electrical energy in useful fuels.”

In particular, the lab studies electrochemical interfaces at the molecular level to better understand how electric fields can drive these transformations. That understanding could help them tune these chemical reactions to produce a wide array of products while dramatically reducing the carbon footprint of the chemicals industry.

“In my group, we really investigate fundamentally how electrocatalytic reactions come about and how to expand the toolkit to understand them better,” says Schreier. “Then we use our insights to expand the scope of reactivities that can be reached with electrocatalysis.”

Schreier received his bachelor’s degree in chemistry and chemical engineering from EPFL, École polytechnique fédérale de Lausanne, in Switzerland and a master’s degree in chemical and bioengineering from ETH Zurich. He conducted his doctoral research at EPFL, developing electrocatalysts and devices for sunlight-driven reduction of carbon dioxide for fuels. As a postdoctoral fellow at the Massachusetts Institute of Technology, he studied the synthesis of fuels using electrical energy as well.

Schreier established his lab at UW–Madison in 2019, where he now has a team of seven graduate students.

“I have very driven students; they are very special,” he says. “Without them, this work would not be possible.”

Besides the Packard Fellowship, Schreier has also earned several industry and society grants, including the prestigious Young Investigator Award from the Arnold and Mabel Beckman Foundation earlier this year.

Schreier says the Packard award will allow him eventually to expand his lab and purchase new equipment as needed. More importantly, it will allow him and his

students to continue pursuing their work, wherever it leads.

“The key benefit is that it will give our lab the flexibility to really explore our ideas,” says Schreier. “It’s an honor for our entire group.”

Schreier is UW–Madison’s 18th Packard Fellowship winner. Since 1988, the Packard Foundation has awarded \$481 million to support 675 scientists and engineers from 54 national universities.