

UC San Diego Collaborates in “Sunlight-to-Fuels” Energy Innovation Hub

Five-year, \$122 million DOE grant aims for breakthroughs in energy production

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The University of California, San Diego, will collaborate with other institutions to help produce fuels from sunlight, the U.S. Department of Energy has announced.

The \$122 million, five-year grant establishes the Joint Center for Artificial Photosynthesis (JCAP) as part of an Energy Innovation Hub that aims to achieve breakthrough innovations in energy production. The specific goal of the center, according to the DOE, is to develop an integrated solar-energy-to-chemical-fuel conversion system, and to turn discoveries into transportation fuels and other commercial products.

UC San Diego will partner in JCAP with the California Institute of Technology and the DOE's Lawrence Berkeley National Laboratory, the project's leaders. Clifford P. Kubiak, H.C. Urey Professor of Chemistry at UC San Diego, will serve as project leader for molecular catalysts in JCAP.

"The center's goal of producing fuels such as hydrogen and liquid hydrocarbons in a carbon-neutral fashion is completely in alignment with our campus sustainability objectives," said Chancellor Marye Anne Fox. "Our campus is committed to finding solutions to the climate challenges we face."

UC San Diego's Vice Chancellor for Research, Arthur B. Ellis, said that the university will contribute "considerable experience" in translational science to the center. "JCAP's bold approach to accelerating the process of discovery in the field of artificial photosynthesis will blend innovative science with translational research to transform - with unprecedented speed and synergy - basic discoveries in the labs into viable solar-fuels systems," he said.

One of three new hubs receiving funding, the Fuels from Sunlight Energy Innovation Hub also includes the SLAC National Accelerator Laboratory; Stanford University; UC Berkeley; UC Santa Barbara; and UC Irvine.

The DOE-funded hubs are large, multi-disciplinary, highly collaborative teams of scientists and engineers working to achieve specific high-priority goals.

UC San Diego's Kubiak will lead a team of scientists from Cal Tech, Berkeley, and UC San Diego, along with their graduate students and postdoctoral scholars, to develop the best molecular catalysts for "splitting" water into hydrogen fuel and oxygen, and for reducing carbon dioxide to liquid fuels.

"This is a huge opportunity to put some of the best scientists in the nation on one of the largest challenges confronting our planet - to direct renewable energy from the sun toward the production of the sources of energy we need to sustain our society, economy, and national security," said Kubiak.

"Technically, the scale and scope of the JCAP will provide the research platform to integrate the catalysts developed at UC San Diego with the solar-light collection, charge separation, and membrane technologies that together will comprise the solar fuels generators of the future," Kubiak said.

"The rapid feedback between discovery and application will put the development of the best possible catalysts on a very fast track. The goal of the JCAP Hub is to transfer functionality discovered at the nano-scale to the macro-scale systems that will be used to generate enormous quantities of fuels from the sun, water, and carbon dioxide. Whatever the final systems will look like, one thing is clear: they will require catalysts to manage the formation and cleavage of chemical bonds that convert CO₂ and water to fuels."

The ultimate objective of JCAP research, according to the DOE, is to drive the field of solar fuels from fundamental research, where it has resided for decades, into applied research and technology development, thereby setting the stage for the creation of a direct solar-fuels industry.

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