Government, community and business leaders tour UC Irvine laboratories

Anteater Academy participants learned about the latest in sustainable energy research

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School of Physical Sciences Dean James Bullock addressed a group of nearly 40 business, community and government representatives who came to UC Irvine recently to learn about sustainable energy research happening on campus.

A group of some 40 individuals — including elected officials, community leaders and business representatives — came to the Susan & Henry Samueli Interdisciplinary Science and Engineering Building recently to learn about sustainable energy research at UC Irvine.

The learning event was part of the quarterly Anteater Academy series organized by UC Irvine's Community and Government Relations office. Each meeting focuses on a specific field of research on campus, encompassing health and medicine, climate and environment and more.

Alberto Sandoval, UC Irvine's assistant vice chancellor of community and government relations, greeted the guests with an introduction to the university and a discussion about its role in the community before handing off to James Bullock, dean of the School of Physical Sciences.

A prominent astronomer with expertise in the study of galaxy formation, galaxy evolution and galactic dark matter halos, Bullock discussed the looming climate crisis on Earth in a cosmological context.

The dean delved into the long history and legacy of research on the Earth system at UC Irvine, dating back to work done by atmospheric chemist F. Sherwood Rowland and postdoctoral scholar Mario Molina, who identified how human activities were emitting gases that were harming the Earth's ozone layer, resulting in the two winning the Nobel Prize in Chemistry. He also discussed the many ongoing projects at UC Irvine devoted to making sustainable energy a reality in California and beyond.

Following Bullock's remarks and time for questions and answers, the visitors broke into smaller groups to tour laboratories. For some, the first stop was at the ground floor lab of David Kisailus, professor of materials science and engineering.

The Kisailus lab in ISEB – one of three he operates on campus – features a dozen or so aquarium tanks inhabited by the creatures he and his team studies. He looks at the physical features of these specimens – the super-hard club appendage that the mantis shrimp uses to pummel its prey or the extremely crush-resistant exoskeleton of the diabolical ironclad beetle – to get biological inspiration for the development of advanced composite materials and methods that can be used to improve efficiencies in aviation, ground transportation, space exploration and sustainable energy.

Kisailus guided the tour group around the lab, stopping at several benches where his graduate students discussed their ongoing biomimetic investigations and experiments, many of which offer the potential for breakthroughs in lithium-ion battery fast charging, impact-resistant surfaces for vehicles and ways to extract rare-Earth minerals from ordinary rocks distributed broadly around the world.

While some visitors were meeting with the Kisailus group, others were four floors up in the laboratory of Jenny Yang, professor of chemistry. Yang and her students provided an overview of 4C, the Center for Closing the Carbon Cycle.

The team is working continuously to find ways to remove carbon dioxide from the atmosphere and turn it into useful commodities. In one part of the Yang lab, graduate student researchers are developing a technique whereby CO2 adheres to “sorbent” molecules. The gas is then upcycled into a green and sustainable form of methane, resulting in a net reduction of carbon dioxide in the atmosphere.

Another Yang lab researcher works on a project to use chemically manipulated alcohols as sorbents that can react with low concentrations of carbon dioxide even in wet environments.

Other Yang group team members are developing electrochemical devices to take carbon out of the air, from atmospheric concentrations, which are 0.04 percent C02, to powerplant and industrial flue valve emissions which can reach 13 percent. The cell being created in the Yang lab has the potential to achieve 100 percent efficiency compared to existing thermal-based CO2 capture systems that are about 20 percent efficient.

Attendee Katie McEwen, a member of the Irvine Unified School District Board of Education, said the Anteater Academy event was an eye-opener for her.

“It was amazing to come to the UC Irvine campus to see first-hand the kind of research going on there,” she said. “It was particularly inspiring to meet the young graduate students being mentored by Professor David Kisailus and Professor Jenny Yang. As an educator in Irvine, it makes me proud to witness such a high level of learning and achievement happening in our own backyard.”

Information about Anteater Academy and other UC Irvine Community and Government Relations programs can be found at https://cgr.uci.edu/.

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