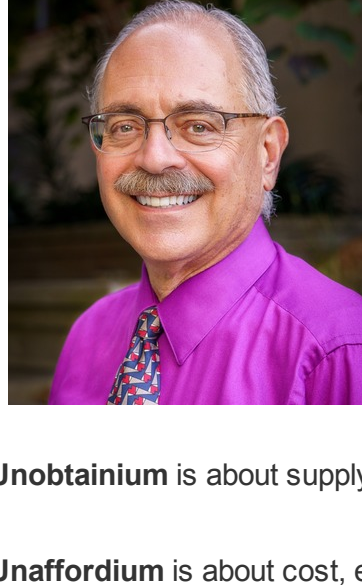


Unobtainium, Unaffordium, Impossibilium and Handwavium



As a young engineer, I learned that the four essential elements never to be used in a mechanical design were Unobtainium, Unaffordium, Impossibilium and Handwavium.

Is this design wisdom out-of-date?

No, I don't think so. These four words connect engineers and computer scientists to the big issues that we can't ignore as technologists working for the public good.

Unobtainium is about supply chain resilience and security.

Unaffordium is about cost, especially the accurate accounting of hidden costs.

Impossibilium is about the folly of ignoring reality in all its forms: geopolitical, economic, and climate impact, all in addition to the physical laws of the world.

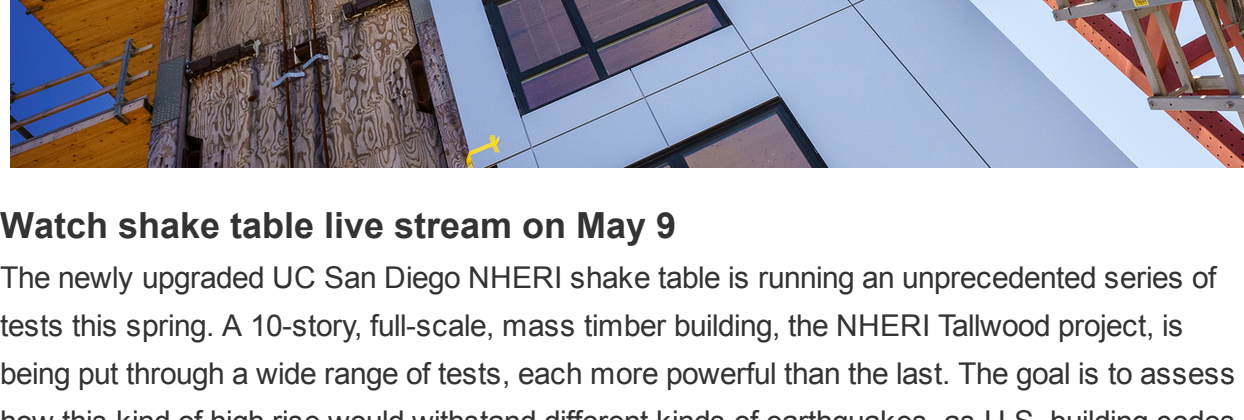
And **Handwavium**? ... [Read my entire Dean's column here.](#)



#1 for research expenditures in California

The UC San Diego Jacobs School of Engineering is #1 in California, and #1 on the West Coast, for engineering and computer science research expenditures. The Jacobs School increased its research expenditures by 12.6% year over year to \$244.7M. This stat was released as part of the latest U.S. News & World Report Rankings of Best Engineering Schools. The Jacobs School ranked #12 in the nation this year, and #8 among the nation's public engineering schools. In the same US News Rankings, the bioengineering graduate program ranked #5 in the nation, and the Computer Science, Systems graduate program ranked #8. See all our top-25 programs in the link below.

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Watch shake table live stream on May 9

The newly upgraded UC San Diego NHERI shake table is running an unprecedented series of tests this spring. A 10-story, full-scale, mass timber building, the NHERI Tallwood project, is being put through a wide range of tests, each more powerful than the last. The goal is to assess how this kind of high rise would withstand different kinds of earthquakes, as U.S. building codes now allow mass timber buildings that are more than 7 stories tall. You can watch the tests streamed live on May 9 at the following links: [YouTube](#), [LinkedIn](#), and [Facebook](#). Read more about the tests in the link below.

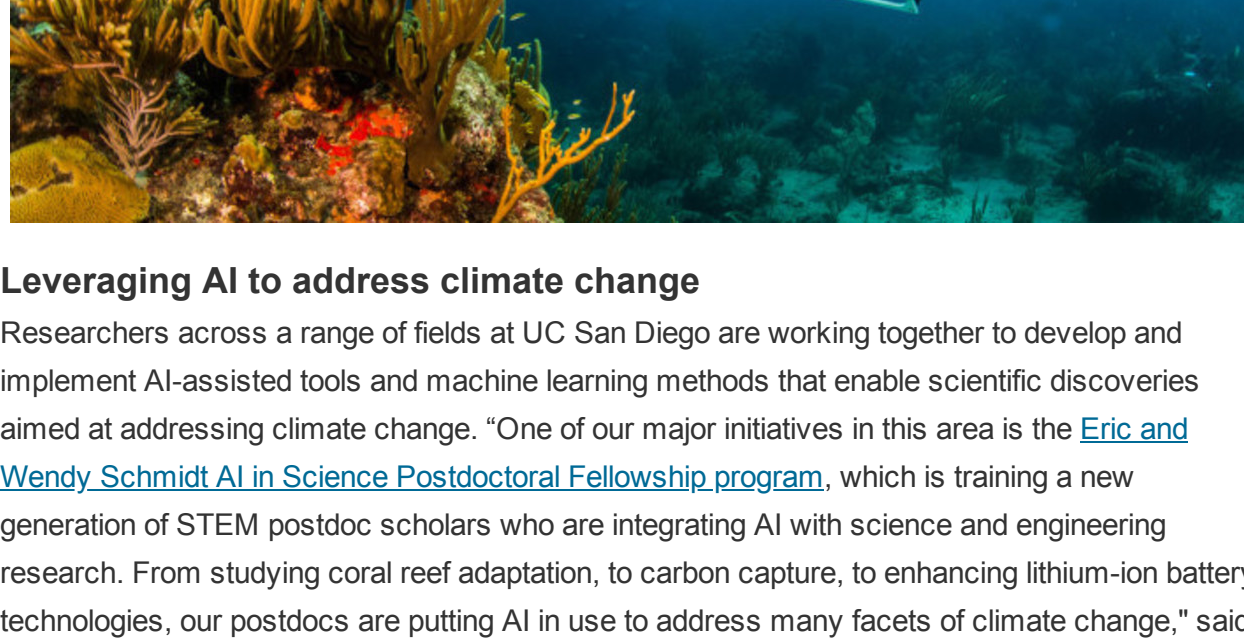
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AlertCalifornia: Essential tools for natural disasters

ALERTCalifornia is a new UC San Diego collaborative public safety program. It provides tools to prepare for, respond to, and recover from wildfires and other natural hazards. The recently expanded state-focused program, formerly part of the ALERTWildfire camera network, manages more than 1,000 pan-tilt-zoom wildfire monitoring cameras and sensor arrays in California. "Our work informs the creation and use of a large-scale digital-twin of California that aggregates the different sensor streams and provides a means to study them, turning data into insights, knowledge and action," said UC San Diego structural engineering professor Falko Kuester, the project co-lead. The team is led by UC San Diego's Scripps Institution of Oceanography geoscientist Neal Driscoll.

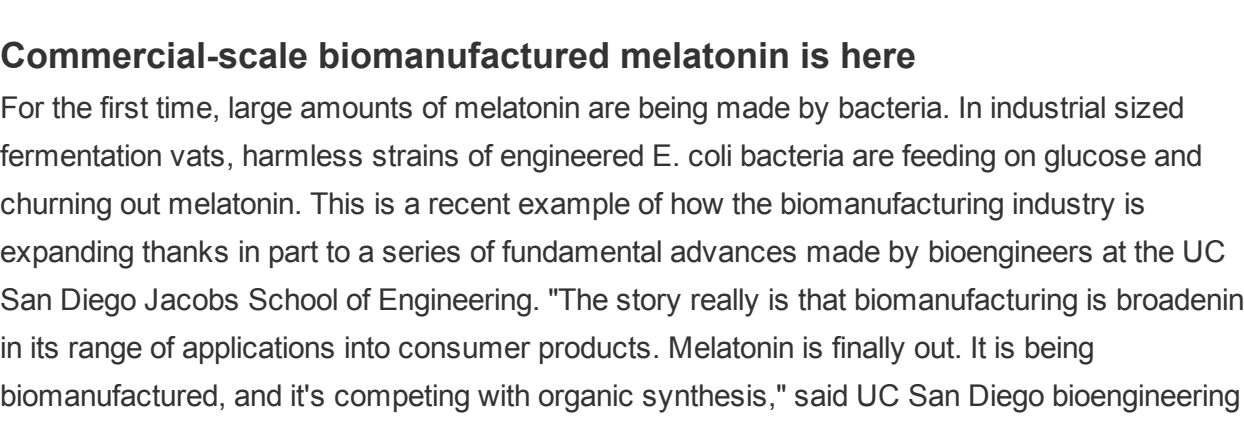
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Leveraging AI to address climate change

Researchers across a range of fields at UC San Diego are working together to develop and implement AI-assisted tools and machine learning methods that enable scientific discoveries aimed at addressing climate change. "One of our major initiatives in this area is the [Eric and Wendy Schmidt AI in Science Postdoctoral Fellowship program](#), which is training a new generation of STEM postdoc scholars who are integrating AI with science and engineering research. From studying coral reef adaptation, to carbon capture, to enhancing lithium-ion battery technologies, our postdocs are putting AI in use to address many facets of climate change," said electrical engineering professor Tara Javidi, who co-directs the [UC San Diego Center for Machine Intelligence, Computing, and Security](#) and is also part of the Halicioğlu Data Science Institute.

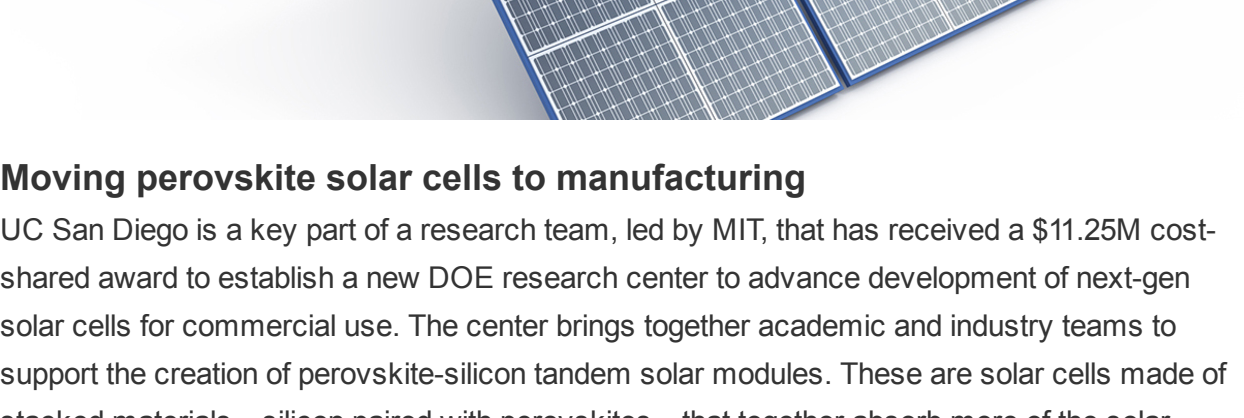
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Commercial-scale biomanufactured melatonin is here

For the first time, large amounts of melatonin are being made by bacteria. In industrial sized fermentation vats, harmless strains of engineered E. coli bacteria are feeding on glucose and churning out melatonin. This is a recent example of how the biomanufacturing industry is expanding thanks in part to a series of fundamental advances made by bioengineering at the UC San Diego Jacobs School of Engineering. "The story really is that biomanufacturing is broadening in its range of applications into consumer products. Melatonin is finally out. It is being biomanufactured, and it's competing with organic synthesis," said UC San Diego bioengineering professor Bernhard Palsson.

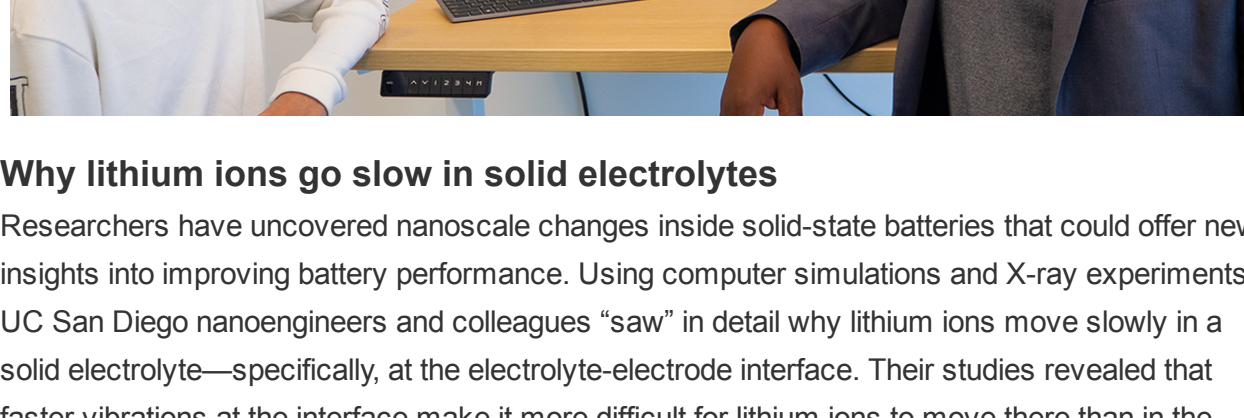
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Moving perovskite solar cells to manufacturing

UC San Diego is a key part of a research team, led by MIT, that has received a \$11.25M cost-shared award to establish a new DOE research center to advance development of next-gen solar cells for commercial use. The center brings together academic and industry teams to support the materials—silicon-kite-silicon perovskites—that together absorb more of the solar spectrum than single materials, resulting in a dramatic increase in efficiency. The UC San Diego team is led by nanoengineering professor David Fenning: "With this new center, we will bring research labs and the emerging perovskite industry together to improve reproducibility and reduce time to market." Fenning is part of the [UC San Diego Sustainable Power and Energy Center \(SPEC\)](#).

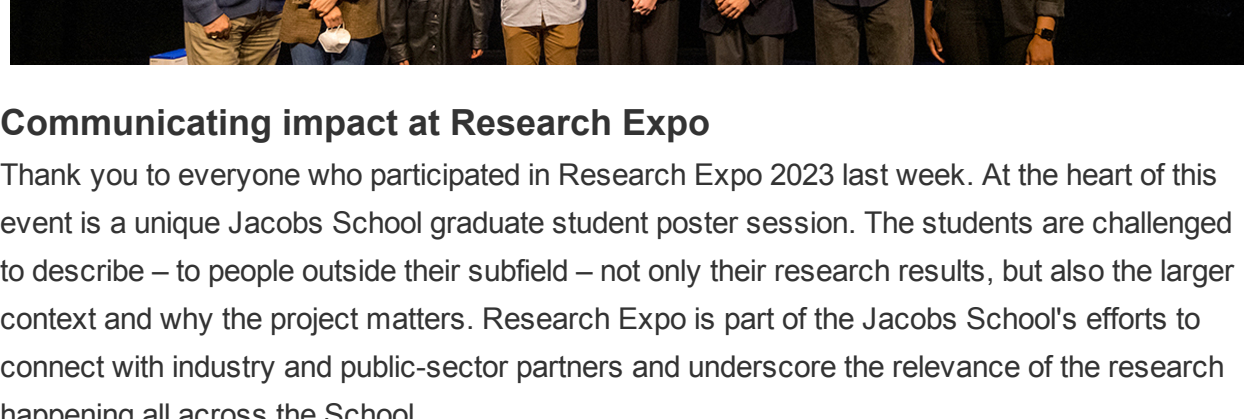
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Why lithium ions go slow in solid electrolytes

Researchers have uncovered nanoscale changes inside solid-state batteries that could offer new insights into improving battery performance. Using computer simulations and X-ray experiments, UC San Diego nanoengineers and colleagues "saw" in detail why lithium ions move slowly in a solid electrolyte—specifically, at the electrolyte-electrode interface. Their studies revealed that faster vibrations at the interface make it more difficult for lithium ions to move there than in the rest of the material. Their findings, published in Nature Materials, could lead to new strategies to enhance ionic conductivity in solid-state batteries. At UC San Diego, this work is led by nanoengineering professor Tod Pascal, who is part of the [UC San Diego Sustainable Power and Energy Center \(SPEC\)](#).

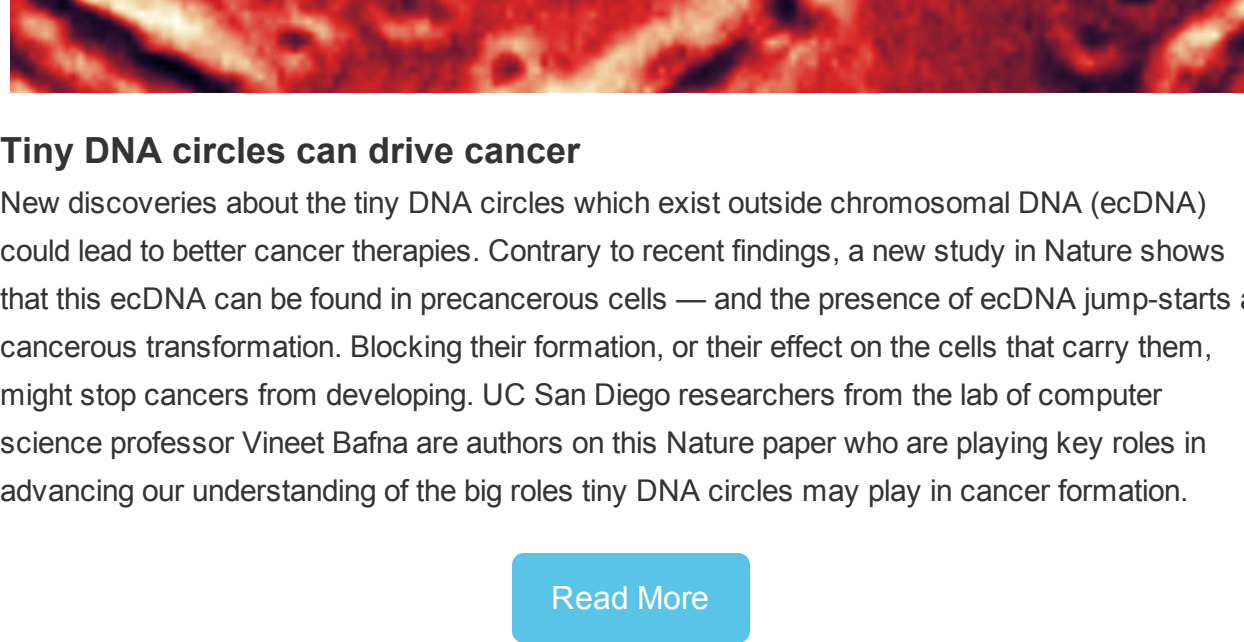
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Communicating impact at Research Expo

Thank you to everyone who participated in Research Expo 2023 last week. At the heart of this event is a unique Jacobs School graduate student poster session. The students are challenged to describe – to people outside their subfield – not only their research results, but also the larger context and why the project matters. Research Expo is part of the Jacobs School's efforts to connect with industry and public-sector partners and underscore the relevance of the research happening all across the School.

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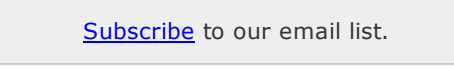
Tiny DNA circles can drive cancer

New discoveries about the tiny DNA circles which exist outside chromosomal DNA (ecDNA) could lead to better cancer therapies. Contrary to recent findings, a new study in Nature shows that this ecDNA can be found in precancerous cells — and the presence of ecDNA jump-starts a cancerous transformation. Blocking their formation, or their effect on the cells that carry them, might stop cancers from developing. UC San Diego researchers from the lab of computer science professor Vineet Bafna are authors on this Nature paper who are playing key roles in advancing our understanding of the big roles tiny DNA circles may play in cancer formation.

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