

Making breakthroughs in distributed energy.

We collaborate to solve key technical challenges that are holding back distributed-energy storage and generation, and accompanying power-management systems.

We research and develop higher-performance and lower-cost materials and devices for energy generation, storage and conversion.

We partner with innovators on electric vehicles, microgrids, photovoltaic panels, wind turbines, wearable power devices and more.

UC San Diego's world-renowned microgrid serves as a real-world test bed for our work, which is rooted in thoughtful analyses of the economics of distributed energy.

Collaborate with us.

FROM THEORY TO MICROGRID, WE INNOVATE.

THEORY AND COMPUTATION

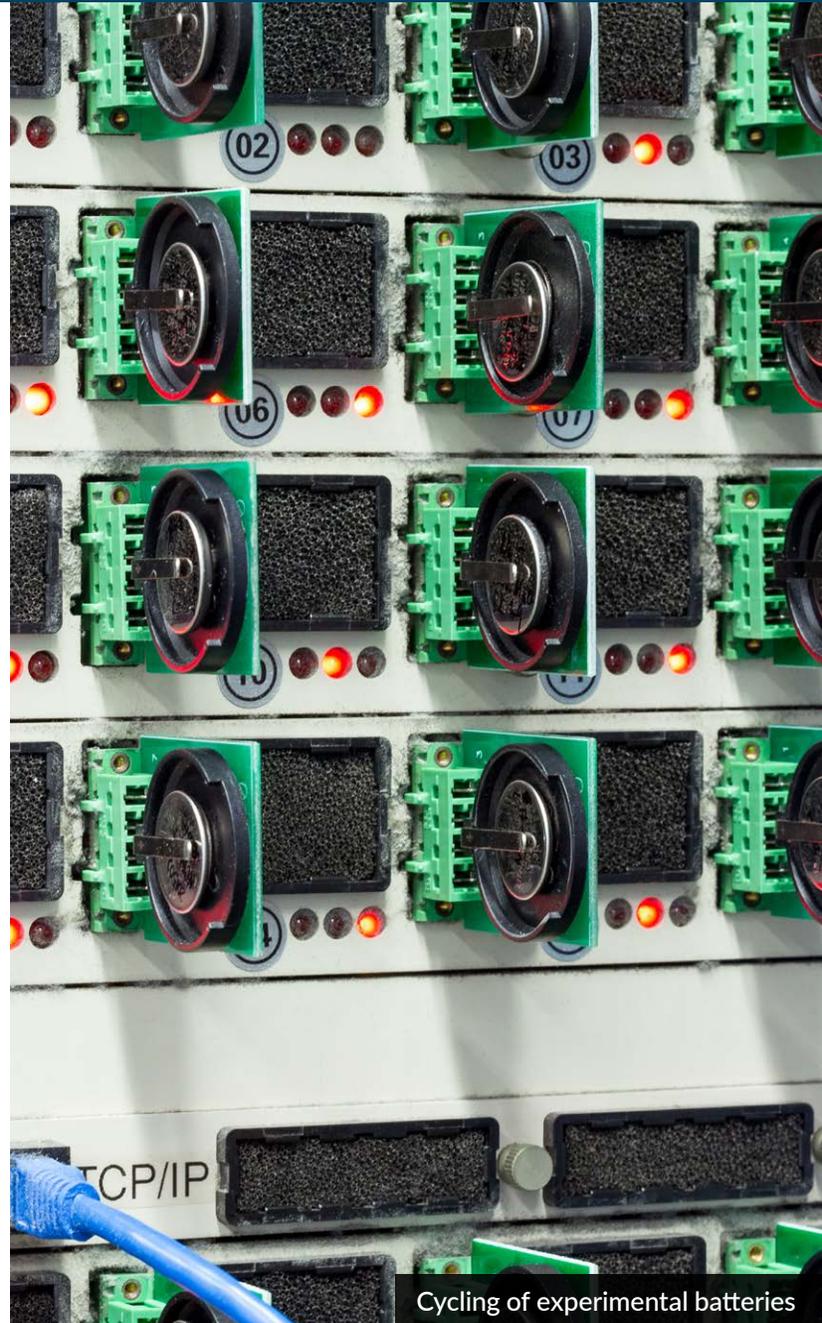
SYNTHESIS AND FABRICATION

CHARACTERIZATION AND DIAGNOSIS

MANUFACTURING AND INTEGRATION

MICROGRID TESTING

ECONOMIC EVALUATION

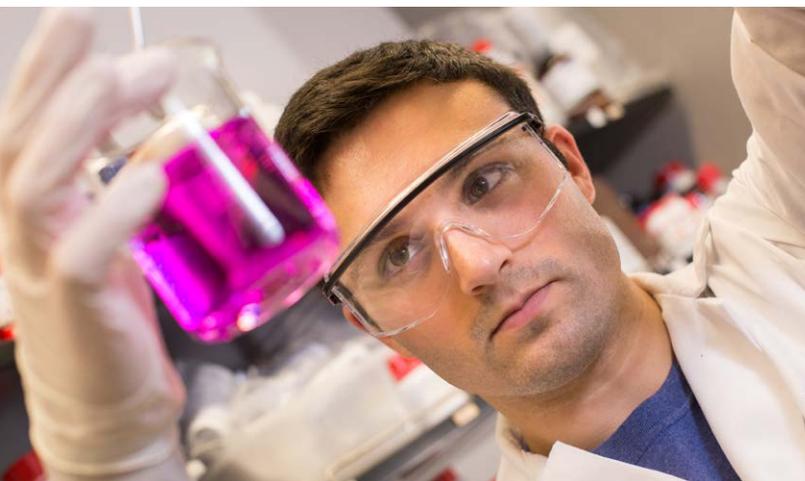


Cycling of experimental batteries

Your Energy Workforce

We train and mentor our students to become tomorrow's workforce for green and advanced energy.

Engage and recruit students working at the cutting edge of materials genome computation and design, real-time monitoring of energy devices, scalable nanomaterials manufacturing methods, microgrid design and control, and economic analysis of disruptive new technologies in microgrids.



Interfaces: Demons in Energy Devices

“Devices for energy storage and conversion live and die at materials interfaces – and yet – materials behavior at crucial interfaces is often a mystery. Our research teams have developed unique expertise to design, control and characterize energy-materials interfaces like never before. We work from the atomic level up through nano, micro and macro scales. Through the synergy of interfacial science and engineering, we are uniquely positioned to design, predict and characterize what is occurring – sometimes in real time – at key materials interfaces.”

— **Shirley Meng, Ph.D.**
Sustainable Power and Energy Center Director



NANOENGINEERING

Zheng Chen

Nanostructured and polymeric materials for electrochemical energy storage and conversion

David Fenning

Defect engineering for high efficiency solar cells and solar-to-fuels

Darren Lipomi

Ultra-flexible and stretchable solar cells and inexpensive, large-area graphene

Ping Liu

Materials and architectures for energy conversion and storage systems

Jian Luo

Novel materials processing methods and interfacial engineering of materials for energy-related applications

Shirley Meng

Electrochemical energy storage and conversion materials, advanced diagnosis for battery materials

Shyue Ping Ong

Data-driven computational design of materials

Tod Pascal

Theory, simulations, materials physics, spectroscopy, characterization, thermodynamics

Andrea Tao

Colloidal synthesis, low dimensional materials for energy storage, plasmonic nanoparticles for photovoltaics and photocatalysis

Joseph Wang

Wearable energy harvesting devices, porous electrodes and electrocatalysis

Sheng Xu

Soft inorganic materials for energy harvesting and storage devices

Kesong Yang

High-throughput computational design and property optimization of functional materials

PHYSICS

Oleg Shpyrko

Advanced X-ray microscopy of ionic, magnetic and electronic materials

CHEMISTRY AND BIOCHEMISTRY

Michael Sailor

Silicon nanotechnology, surface chemistry and coatings, silicon-lithium anodes, photonic crystals

COMPUTER SCIENCE AND ENGINEERING

Tajana Rosing

Modeling and control of distributed energy resources, Internet of Things infrastructure

ELECTRICAL AND COMPUTER ENGINEERING

Eric Fullerton

Ultra-low-energy memory, processing elements and architectures

Tse Nga 'Tina' Ng

Solution processing and printing methods, flexible electronic devices

MECHANICAL AND AEROSPACE ENGINEERING

Renkun Chen

Materials and devices for thermal energy transport and conversion

Sonia Martinez

Networked system control, distributed optimization algorithms, decision making for autonomous systems

STRUCTURAL ENGINEERING

Yu Qiao

Low-grade heat, energy harvesting, green cement, energy efficiency, thermal runaway in batteries

ECONOMICS

Graham Elliott

Market specific algorithms to construct realistic estimates of the direct economic value of the energy storage device

Richard Carson

Forecasting greenhouse gas emissions; role of economic incentives, regulation and technical change on energy systems; valuation of non-market impacts

UC SAN DIEGO MICROGRID

Antoni Tong

Senior Development Engineer

JOIN US

We welcome industry partners, faculty members and researchers to join the Sustainable Power and Energy Center.

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