



The University of California
Advanced Solar Technologies Institute
(UC Solar)

Research—Innovation—Education

UCMERCED

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UC Solar Mission Statement

UC Solar creates technologies that make solar energy systems more efficient, more affordable, and the best choice for the people of California and the world. In addition, UC solar educates and develops tomorrow's solar energy leaders and entrepreneurs.

UC Solar Overview

- UC Solar is a new multi-campus, multidisciplinary solar research institute made up of faculty and researchers from UC Merced, UC Berkeley, and UC Santa Barbara
- Established in 2010 by a five year, \$2.25 million seed grant from the UC Office of Research
- The institute's faculty members include mechanical engineers, materials scientists, environmental engineers, physicists, biochemists and computer scientists
- UC Solar is led by UC Merced Professor Roland Winston
- Research projects are funded by government, corporate and foundation grants and private philanthropy

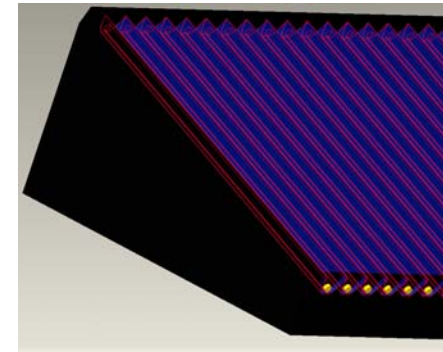
UC Solar Overview

- Initial UC Solar research areas include:
 - **UC Merced:** designing tracking and non-tracking solar concentrators for CPV and thermal applications, developing optics for lighting, and designing and building solar thermal system prototypes
 - **UC Berkeley:** focusing on achieving high-efficiency devices using nanoneedles, nanowires and quantum dots
 - **UC Santa Barbara:** developing materials to harness the ultraviolet portion of the solar spectrum



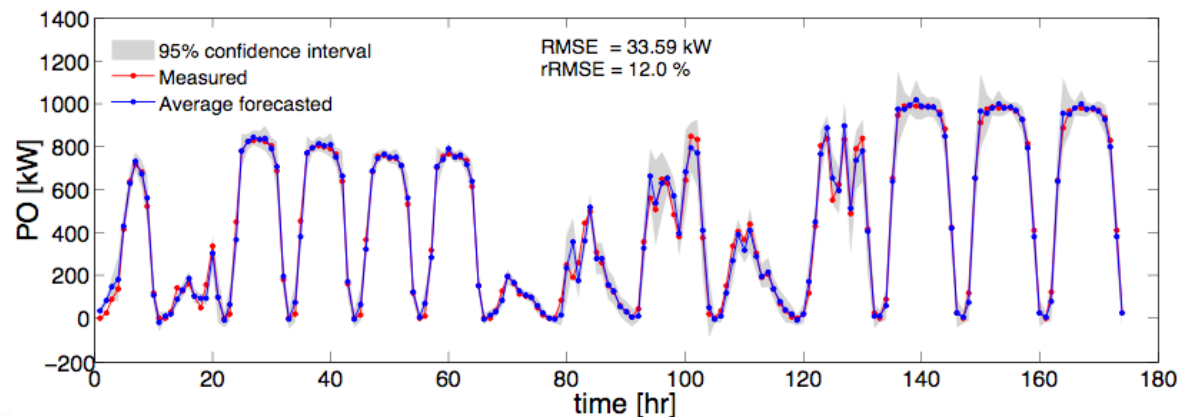
Highlight Project—Solar Cooling

- Development of Low-Cost, Non-Tracking Collector/ Concentrators for Use in Solar Thermal Cooling Systems
 - Targets commercial buildings
 - Collectors power a double effect absorption chiller ($\sim 180^{\circ}\text{C}$)
 - Produces 1Mw thermal energy psm at a target cost of \$150 - \$200 psm
- Reduces power consumption and greenhouse gases
- A prototype 25Mw system (6.5 ton chiller) is being constructed at UC Merced and will launch in May 2010
- CEC funding; prototype funded by philanthropy



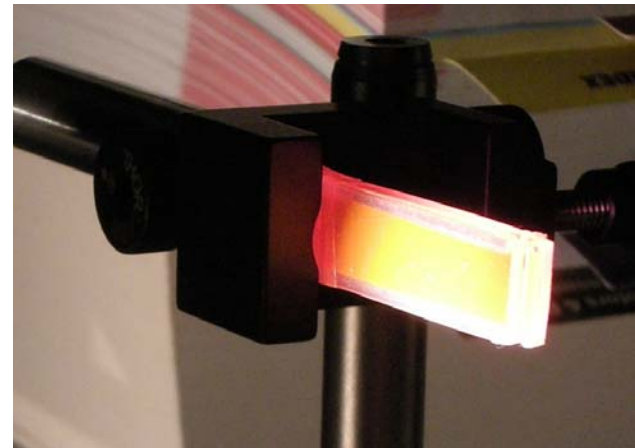
Highlight Project—Solar Forecasting

- For utility-scale users, accurate forecasting of solar system output is essential to large-scale integration
- Spinning reserves can be reduced and scheduling reliability enhanced, resulting in lower overall operating costs
- The Coimbra Solar Forecasting lab at UC Merced has developed data collection and processing techniques that forecast solar availability with unprecedented accuracy



Highlight Project—LSCs

- Developing Efficient, Low-Cost Luminescent Solar Concentrators (“Solar Windows”)
- Bright light emitted by the concentrator can be collected by a Si PV cell attached to the edge
 - Concentrate both direct and diffuse light without tracking
 - Require less PV materials
 - Reduce heat dissipation
 - Easily integrated into buildings



Highlight Project—Hybrid Thermal/PV

- Development of Integrated Hybrid Solar Thermal/ Photovoltaic Collectors
 - Targets residential applications
 - Reduces natural gas/electricity consumption
 - More energy collected in a smaller area
 - Reduces the energy payback time by ~50%
- Proposes the application of PV thin films as coatings on inner glass cylinders of dewar type tubes
- Partnering with Beijing Yongdon Heat-Pipe Solar Technology Limited and Merced-based APG Solar
- CSI funding has been applied for; additional grant funding is being pursued



The UC Solar Operating Model

- Assemble a multi-campus, multidisciplinary team of faculty with a broad range of solar technology expertise
- Partner with industry to identify technical barriers and conduct research that reduces and/or removes those barriers
- Envision and create a new generation of solar technologies, and develop and license these technologies
- Educate future workers and entrepreneurs
- Provide unbiased feedback to sponsors, state agencies, venture capitalists, and other solar energy stakeholders
- Be self-sustaining through research grants, philanthropic gifts and corporate sponsors

UC Solar Industry Partners

- The UC Solar Industry Consortium enables collaboration with industry and helps ensure that innovations can be brought to market quickly and efficiently
- UC Solar Consortium Members (or “Sponsors”) pay a modest annual fee to:
 - Partner with some of the UC’s finest scientific minds and the solar industry’s most progressive companies
 - Participate in research projects and receive advance knowledge of scientific breakthroughs and new inventions
 - Work closely with students and postdoctoral researchers
 - Influence the solar research and education agenda at the world’s leading research university

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UC Solar Objectives

- Establish the UC as the leader in solar energy research and education
- Help transform the economy of California (and the Central Valley)
- Align UC Merced with the core domestic challenge of the 21st century—energy independence
- Be the hub of the “Solar Valley”



Contact Us

- For more information regarding UC Solar, please visit the UC Solar website at: <http://cast.ucmerced.edu>
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