Advanced Research Projects Agency • ENERGY

FIRST OPEN SOLICITATION

TELEDYNE SCIENTIFIC & IMAGING

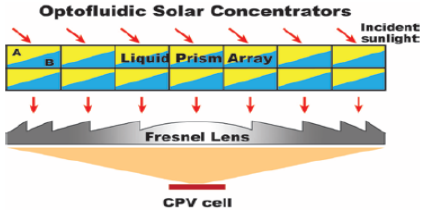
EFFICIENT SOLAR CONCENTRATORS

PROJECT TITLE:	Optofluidic Solar Concentrators		
ORGANIZATION:	Teledyne Scientific & Imaging, LLC	LOCATION:	Thousand Oaks, CA
PROGRAM:	FOA1	ARPA-E AWARD:	$1,000,272
TECH TOPIC:	Solar Power Control Systems	PROJECT TERM:	10/1/10 – 9/30/12
WEBSITE:	www.teledyne.com		

CRITICAL NEED

Photovoltaic (PV) solar electric systems are a promising clean energy alternative to traditional sources of electricity generation, such as coal-burning power plants. One of the biggest obstacles to the widespread deployment of PV systems is the fact that they are not cost competitive with traditional sources of electricity generation. Concentrating photovoltaic (CPV) solar cells—which use mirrors, prisms, and lenses to concentrate a large amount of sunlight onto a small area to generate electricity—can reduce the cost of PV systems. However, CPV cells require bulky, expensive, and unreliable solar tracking components which make building rooftop integration difficult.

PROJECT INNOVATION + ADVANTAGES



Teledyne is developing a liquid prism panel that tracks the position of the sun to help efficiently concentrate its light onto a solar cell to produce power. Typically, solar tracking devices have bulky and expensive mechanical moving parts that require a lot of power and are often unreliable. Teledyne's liquid prism panel has no bulky and heavy supporting parts—instead it relies on electrowetting. Electrowetting is a process where an electric field is applied to the liquid to control the angle at which it meets the sunlight above and to control the angle of the sunlight to the focusing lens—the more direct the angle to the focusing lens, the more efficiently the light can be concentrated to solar panels and converted into electricity. This allows the prism to be tuned like a radio to track the sun across the sky and steer sunlight into the solar cell without any moving mechanical parts. This process uses very little power and requires no expensive supporting hardware or moving parts, enabling efficient and quiet rooftop operation for integration into buildings.

IMPACT

If successful, Teledyne's liquid prism would facilitate rooftop integration of PV/CPV technologies by significantly reducing their cost and increasing their operational efficiency.

- SECURITY: Cost-effective solar energy would increase U.S. renewable energy use and help reduce our dependence on fossil fuels.
- ENVIRONMENT: Replacing energy systems powered by fossil fuels would provide an immediate decrease in greenhouse gas emissions, of which electricity generation accounts for over 40%.
- ECONOMY: Cost-effective renewable energy alternatives would reduce fuel prices and stabilize electricity rates for consumers. Integrating these renewable technologies directly into buildings will reduce stress on the electric grid.
- JOBS: Projects like this would create jobs in the solar-power supply chain, including jobs in manufacturing, engineering, construction, and finance.

CONTACTS

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