New solar concentrator design (w/ Video)

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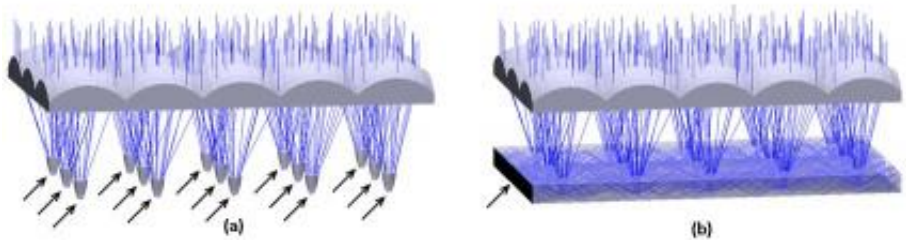

A new solar concentrator design from an electrical engineering Ph.D. student at the University of California, San Diego could lead to solar concentrators that are less expensive and require fewer photovoltaic cells than existing solar concentrators. Image credit: UC San Diego / Jason Karp

A new solar concentrator design from an electrical engineering Ph.D. student at the University of California, San Diego could lead to solar concentrators that are less expensive and require fewer photovoltaic cells than existing solar concentrators. The graduate student, Jason Karp and his colleagues at the UC San Diego Jacobs School of Engineering presented the new solar concentrator in a paper in the January 2010 issue of the journal *Optics Express*.

On April 15, Karp and his solar concentrator won the 2010 Rudee Research Expo Outstanding Poster Award at the 29th Annual Research Expo at the UC San Diego Jacobs School of Engineering.

While engineers have already developed high-efficiency solar

concentrators that incorporate optics to focus the sun hundreds of times and can deliver twice the power of rigid solar panels, the new design offers potential new benefits. Existing solar concentrator systems typically use arrays of individual lenses that focus directly onto independent photovoltaic cells which all need to be aligned and electrically connected. In contrast, the new solar concentrator collects sunlight with thousands of small lenses imprinted on a common sheet. All these lenses couple into a flat "waveguide" which funnels light to a single photovoltaic cell.

Karp built a working prototype with just two primary optical components, thus reducing materials, alignment and assembly. This solar concentrator is compatible with high-volume, low-cost manufacturing.

"The real reason that we are trying to do this type of concentrator is certainly for cost," said Karp in an interview after winning best poster at Research Expo 2010 at the UC San Diego Jacobs School of Engineering. Karp explained that his design minimizes the cost for the optics associated with the entire system. One path to building optics very cheaply leads engineers to existing manufacturing techniques. The new solar concentrator is compatible with existing roll-to-roll processing techniques involved in fabricating large televisions.

Karp designed and built prototypes for the new solar concentrator in the Photonic Systems Integration Laboratory led by electrical engineering professor Joseph Ford from the UC San Diego Jacobs School of Engineering.

More information: Optics Express paper at: psilab.ucsd.edu/publications.html

Provided by University of California - San Diego