

Spray-On Solar Technology and Incorporation of Various Nano-Semiconductors

By Chase Attermann

SprayLD System



*(1)

“This is something you can build in a Junkyard Wars fashion, which is basically how we did it.”

Illan Kramer

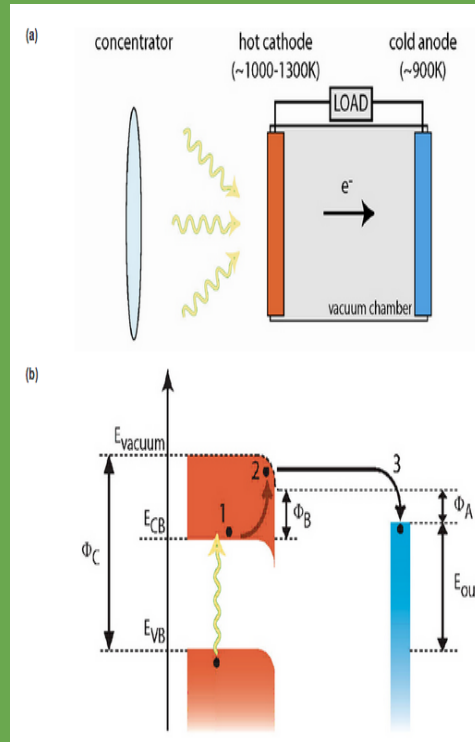
Synthesis

- Illan Kramer and his research team at the University of Toronto invented spray-on solar cells can coat any surface.
- Created from chains of insulating molecules into semiconducting colloidal quantum dots.
- Adjusting the size can adjust spectrum of light absorbed including infrared.

Maximizing the Efficiency of Solar Cells

Concentrated Solar Power (CSP)

- Method of using mirrors to reflect sunlight into a point (figure a.)
- More light & heat will reach the solar cell.



*(4)

Thermal Conversion Cycle (TCC)

- Using Law of Thermodynamics to cycle particles (figure b.)
- CSP and TCC improved efficiency by 20 percent in Nick Melosh's PETE Device.
- Kramer's spray could potentially utilize CSP and TCC.

Efficiency of Various Semiconductors

Silicon



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- Used in traditional solar panels.
- Cheap and easy to manufacture.
- Peak efficiency being 20 percent at 100 C.
- Cannot absorb infrared.

Cesium

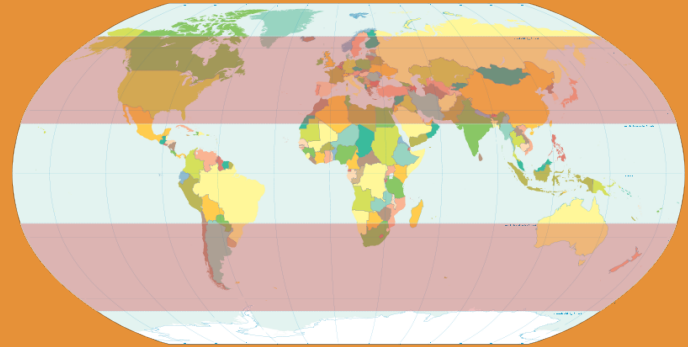
- Improves efficiency when layered over a semiconductor.
- Boosted peak efficiency of gallium nitride to 200 C in Melosh's proof of concept test.

Gallium Arsenide

- The most efficient semiconducting solar material known today.
- Peak efficiency of 40 percent at over 500 C
- Cost limits its feasibility to labs and specialty applications.

*(2)

Climate



*(3)

When spray-on solar cells hit the market, the choice of semiconducting material will depend on your budget and how efficient the spray will be in your area.

Applications of Solar Spray

Nanoflex

- Nanoflex recently patented a reusable gallium arsenide wafer.
- Partnering with the owners of solar-cell spray, the corporation is confident they will lead the market in solar technology.
- Hydrogen Powered Cars
- Jackets
- Rooftops

Solar Farms

- Large rolls can be laid across deserts.
- "If we could cover 0.1 percent of the Earth's surface with [very efficient] large-area solar cells, we could in principle replace all of our energy habits with a source of power which is clean and renewable.." (Ted Sargent, 2005.)



The Race to Mass-Production and the Future of Solar-Spray

Perovskites

- Silicon nano-crystals.
- Fast method developed by Brown University.
- “These [films] could potentially be used for decorative, building-integrated windows that can make power.” (Padture 2015.)

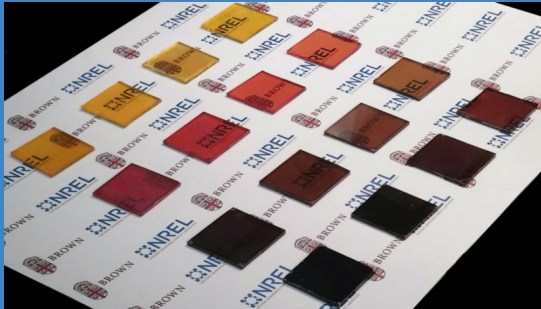


Photo: Lab
Brown
University

Outside the U.S

- VTT Technical Center of Finland is preparing to mass-produce solar coating for buildings.
- Trina Solar set the record for most efficient p-type silicon modules.
- Solar energy is already competing with oil companies in India and China.

THE FUTURE

- Solar panels may soon be replaced with a variety of spray cans.
- Oil rig workers could replace their jobs with positions in a solar factories.
- The costs of solar power may someday relate to the costs of mass-produced foods.

“My dream is that one day you’ll have two technicians with Ghostbusters backpacks come to your house and spray your roof.” *Ilan Kramer*

Sources

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