



TECHNOLOGY

Sub-Bandgap Hot Carrier Solar Cell

OVERVIEW

Background

One month worth of solar radiation contains vastly more energy than is stored in all of the earth's coal, oil, and natural gas reserves. Further, solar energy is the only resource sufficiently large to meet growing global energy demand. Solar power is currently limited in deployment because the cost to generate a Watt of power by solar cells is too expensive. To remedy this situation, we need to bring down the cost of solar cells or improve their efficiency. The loss mechanisms reduce the solar cell maximum power conversion efficiency to about 33.5%. However, losses due to lack of absorption of low energy photons and inefficient use of absorbed energy (thermalization loss) are recoverable.

Innovative Technology

Researchers at the University of Maryland have developed a new type of solar cell that is capable of absorbing photons with energy below the bandgap of the semiconductor material. Incorporating a textured metal surface on the back of a traditional solar cell allows for absorption of sub-bandgap photons. The photons which couldn't be absorbed in the semiconductor are now absorbed in the metal and excite electrons that can pass over the barrier and make it to the semiconductor. These electrons give rise to additional current. The device increases the generated power by increasing the total current while maintaining the voltage – up to 37% of power losses present in a traditional solar cell can be recovered.

APPLICATIONS

Solar power

ADVANTAGES

Better efficiency of a solar cell

Lower cost of generating power by solar cells

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Additional Information

INSTITUTION

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PATENT STATUS

Pending

EXTERNAL RESOURCES

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