

Using convex lenses to gather solar energy for power generation

What is a convex lens solar concentrator?

The two-lens system with convex lens as primary concentrator located 5 cm above the Fresnel lens secondary concentrator. The solar kit, with and without the convex lens attachment, was exposed to sunlight to test its output power by measuring its voltage, current, and temperature using a multimeter.

What is a convex lens system?

The lens system was designed so that the primary concentrator (in this case a convex lens) would be able to refract sunlight from non-perpendicular angles to the secondary concentrator (in this case a Fresnel lens), which would then focus the sunlight onto the solar cell.

Do convex lenses produce more power?

The convex lens setup was tested with the Fresnel lens setup over a 3-day photoperiod by measuring the voltage, current, irradiance, and temperature at every hour. The results showed that the convex lens setup produced 1.94% more power, but only at around midday.

Does convex lens setup produce more power than Fresnel?

The difference in current after 16:21 that was seen in the current versus time graph is no longer evident here. It was found that the convex lens setup produces a 1.94% greater amount of power compared to the Fresnel lens setup.

What is a convex line-focus Fresnel lens?

Convex line-focus Fresnel lenses or dome-shaped Fresnel lenses of bifocal, or non-imaging type are more recently developed for collection of solar rays. Most of the research and development works have been directed at imaging systems and non-imaging systems which represent the future trends of solar concentration applications.

How to improve the efficiency of solar energy conversion systems?

To enhance the overall efficiency of solar energy conversion systems, several major R&D directions such as the application of solar concentrators (lenses or mirrors) for the concentration of sunlight on PV panels, equipping PV panels with cooling systems (PVT system), application of solar tracking systems, etc. can be applied.



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