# Photovoltaic panels have obstructed lens refraction

What is a Fresnel lens concentrating PV cell?
This study presents the design analysis of a Fresnel lens concentrating PV cell which consists of a small linear Fresnel lens and a strip PV cell. A number of cells may form a modular large concentrating PV system using a single sun-tracking system.

What is a concentrating photovoltaic (PV) system?
Concentrating photovoltaic (PV) systems provide an effective way to reduce the cost of electricity production by reducing the amount of silicon required. The use of a Fresnel lens is one of the typical design options for the concentrating PV systems. Compared with a parabolic mirror, a Fresnel lens has its focus behind the lens surface.

Why do photovoltaic systems only collect a fraction of solar energy?
Unfortunately,only a fraction of solar energy can be efficiently collected by photovoltaic systems due to the physical constraints of optical back-reflections and optical interaction length(i.e. the effective optical path length within the PV absorber layer) over a wide range of acceptance angles.

What is the current distribution of a PV cell under a Fresnel lens?
Current distribution of a PV cell under the spot-focus Fresnel lens. An experimental apparatus was set up to measure the performance of a PV cell under a commercial spot-focus Fresnel lens of 0.31 m × 0.31 m. The Fresnel lens PV cell was fixed on a small-scale sun-tracking system as shown in Figure 11 and tested on a clear sky.

Why do solar cells have a low refractive index?
The top layer has a low refractive index to allow the light to enter from any angle,but each step down bends it a little more,until it focuses on the solar cell below. The sides are mirrored to bounce any wayward light back where it needs to go.

Can a Fresnel lens be used to model PV cell irradiance distribution?
In this paper,the irradiance distribution resulted from simulation of the designed Fresnel lens will be used in modelling current flow in the front surface of a PV cell. The effect of sun-tracking deviation and PV cell position will be also considered for a chosen design of Fresnel lens. A Fresnel lens consists of a series of small prisms.

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