

Two-sided Solar Cells Can Collect Scattered Light to Gather More Energy

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To increase the performance of solar panels, a team of researchers based in Saudi Arabia, Italy, Germany and Canada has created solar cells that are both two-sided and two-layered. The prototypes bring together the best of two technologies: silicon and perovskites.

Out in the field, light primarily comes directly from the sun. Conventional tandem solar cells can already convert this light into electricity more efficiently compared to traditional silicon-only solar cells by absorbing additional wavelengths of light.

Now, the researchers have realized that even more energy can be gathered using a two-sided tandem configuration. Light reflected and scattered from the ground — referred to as “albedo” — can also be collected to significantly increase the current of a tandem solar cell.

The research, which was published today in the journal [Nature Energy](#), outlines exactly how the team engineered the perovskite/silicon device to exceed the currently accepted performance limits for the tandem configuration.

“By exploiting the albedo, we can now generate currents higher than in conventional tandems, without increasing the manufacturing costs at all,” said Dr. Michele De Bastiani, the co-lead author of this study. The study’s authors include University Professor Ted Sargent (ECE) and ECE postdoctoral fellow Yi Hou.

The potential for capturing indirect sunlight has been studied in the past, but without experimental verification. In addition to [U of T Engineering](#), [KAUST](#) researchers worked with collaborators from the Karlsruhe Institute of Technology ([KIT](#)), and the [University of Bologna](#) to solve the scientific and engineering challenges required to include indirect sunlight in the energy gathering capacity of their modules.

With this knowledge at hand, they tested the bifacial tandem solar cell in outdoor conditions,

achieving efficiencies beyond any commercial silicon solar panel.

“Bifacial silicon-only solar cells are rapidly taken an increasing share in the photovoltaics market, as they can lead to a performance gain of 20% relative. Exploiting this concept in perovskite/silicon tandems now opens opportunities for ultra-high power generation at affordable cost” concluded Professor Stefaan De Wolf (KAUST).

Read the [original article](#) on University of Toronto.