HELIOFOLD US
Advanced Space Solar Materials

Samples Shipping
September 1st

Bifacia™

Colorless Polyimide Solar Cell Substrate

Bifacia is a high-performance colorless polyimide (CPI) film engineered as a direct drop-in replacement for traditional amber polyimide (PI) substrates. It matches mechanical strength and environmental resistance while unlocking significant gains in power output and thermal management for bifacial solar cell applications.

1 Drop-In Replacement

Colorless PI easily replaces traditional amber PI while maintaining the same mechanical strength and environmental resistance properties.

Fully compatible with existing manufacturing processes — no redesign or revalidation of core assembly steps required.

2 Up to 23% More Power

Enables bifacial solar cells to capture light from both sides, harnessing Earth's albedo (reflected sunlight) to generate up to 23% additional power in LEO compared with monofacial panels.

Maximizes energy yield and consistency in orbit, allowing smaller array size and battery capacity.

3 10°C Cooler Operation

Colorless PI absorbs far less heat than amber PI. Solar cells run up to 10°C cooler, delivering higher conversion efficiency and improved long-term reliability under real-world operating conditions.

Lower temperature stress also extends cell and interconnect life.

ISS case study

The left photo shows the ISS solar array utilizing amber polyimide as the substrate. If colorless PI was used instead (shown in the AI render to the right), bifacial panels could absorb reflected light from earth, generating up to 23% more power during the ISS' orbit.

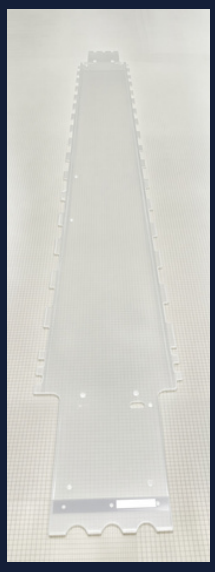
By combining the proven environmental durability of polyimide with optical clarity, Bifacia enables a new generation of high-efficiency bifacial solar arrays without compromising reliability, process compatibility, or mechanical performance. It is the practical path from traditional amber PI to next-generation transparent substrates.

Traditional PI

Traditional amber polyimide substrate provides structural support and environmental protection but blocks the majority of useful light from the rear side.

With ≥90% transmittance, Bifacia allows light reflected from Earth to pass through from underneath, enabling true bifacial operation while retaining PI's beneficial properties.

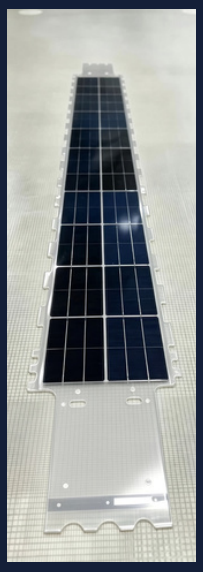
Bifacia™ CPI



Bifacial solar cells mounted on Bifacia substrate generate up to 23% more power in low Earth orbit. Lower heat absorption also keeps the cells cooler, improving efficiency and extending operational life.

Bifacia can be manufactured to custom dimensions/thicknesses with samples available for global delivery from September 1st. To request a sample, please visit www.heliofoldus.com or contact info@heliofoldus.com.

Bifacia™ CPI Array



Technical Specifications

#	Parameter	Specification
1	**Areal Density (at 250μm thick)**	< 300 g/m^2, tolerance ≤ 3%
2	**Transmittance**	≥ 90%
3	**TML (Total Mass Loss)**	< 1%
4	**CVCM (Collected Volatile Condensable Material)**	< 0.1%
5	**Glass Transition Temperature (Tg)**	≥ 120 °C
6	**Adhesion Strength**	≥ 1 N/mm
7	**Bending Radius**	< 20 mm, 100,000 cycles
8	**Insulation Resistance**	≥ 10 MΩ @ 500 V
9	**Coefficient of Thermal Expansion (CTE)**	5 ~ 20 ppm/°C
10	**Environmental Indicators**	AO erosion and total radiation dose shall meet relevant standards and threshold values of corresponding orbit

All values are typical. Final acceptance criteria may be defined per mission requirements and applicable standards.

Real World Orbital Power Data

Real world data shows a satellite in a near-circular sun-synchronous orbit at 535 km with an inclination of ~97.5° receiving a total of 277.7 Wh/m^2 per orbit. 245.9 Wh/m^2 from the front (88.5%) and 31.8 Wh/m^2 (11.5%) from the rear.

The additional power generated by bifacial solar arrays depends on several factors:

- Orbit altitude and path
- Solar-cell bifaciality factor
- Local Earth albedo (surface reflectivity)
- Attitude and array orientation

Under typical low-Earth-orbit conditions, arrays built on Bifacia colorless polyimide can produce up to 23% more energy than equivalent monofacial panels.