

# **The Ultimate Solution of Single-sided Photovoltaic Module**

**Back Contact Technology Using Metal Wrap Through (MWT)**

**Dr. Haofeng Lu**  
**Sunport Power**

- 01 Sunport Power- the Expert in Back Contact Solar**
- 02 Market Application Areas Trend**
- 03 Metal Wrap Through Technology and Its Merits**
- 04 Products Performance**



Jiangsu **Sunport Power** Corp., Ltd. **was founded in 2012** in China and dedicated to R&D and manufacturing of **solar cells and modules** based on advanced **MWT** ( metal wrap through ) **technology**.



The World's First Manufacturer on  
GW-Scale for MWT PV Modules



The Only Single-glass Module with 30-year Power  
Warranty Worldwide

# Company Profile



**Dr. Fengming Zhang**  
**CEO of Sunport Power**

Professor and Doctoral Supervisor of Nanjing University  
UNSW Researcher, PhD of Newcastle University

**100+**

Professional R&D talents



**Prof. Martin Green**  
**Chief Scientist of Sunport Power**

Professor at the University of New South Wales  
Fellow of Australian Academy of Science  
Director of Australian Centre for Advanced Photovoltaics

**20%**

of Revenue for R&D  
Investment

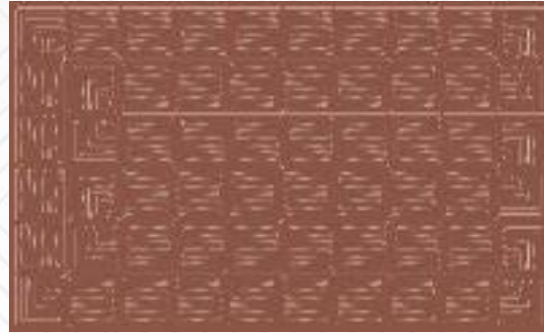
**300+**

Patents worldwide

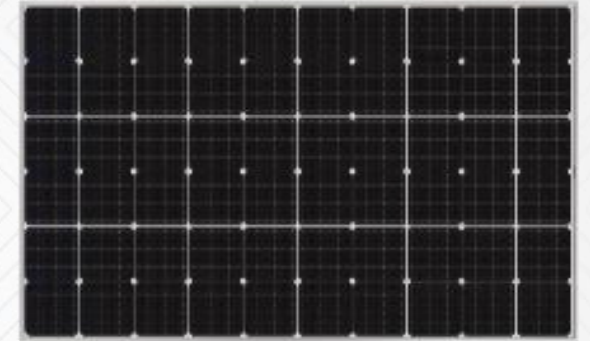
# Company Profile



Solar cells



Conductive  
backsheet



PV modules




Manufacturing  
sites



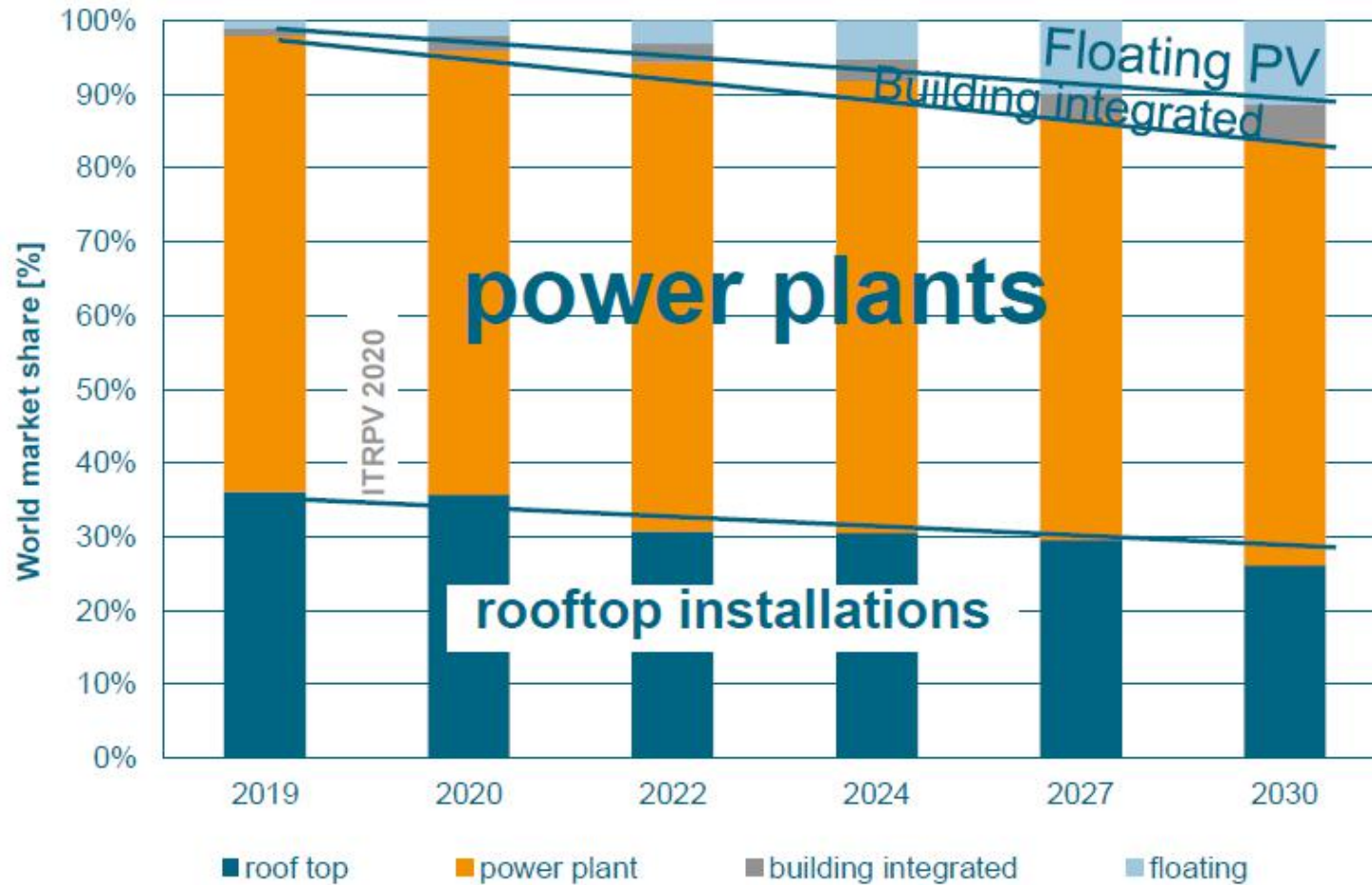
Manufacturing  
factories




MWT vertical  
integrated capacity

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# Market Application Trends



- Ground plant stays main application
  - Rooftop share will keep stable
  - Emerging part: Building integrated and floating PV
- Single facial modules will remain important products
  - Customized scenarios need to be satisfied

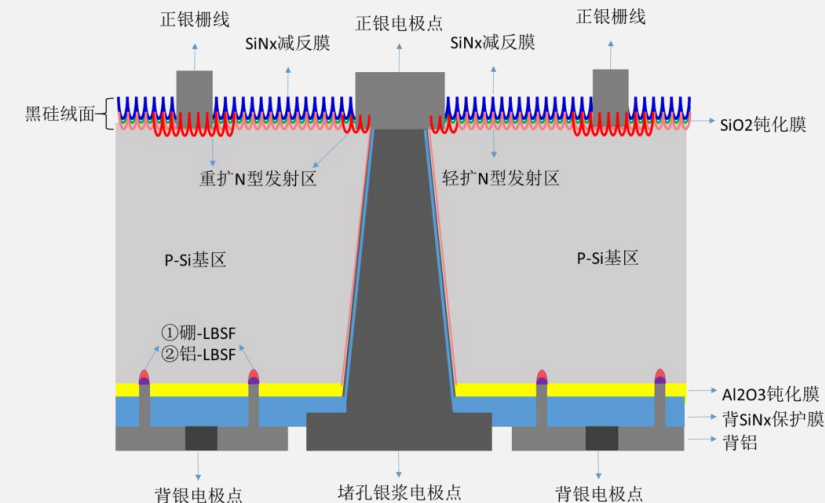
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# Metal Wrap Through

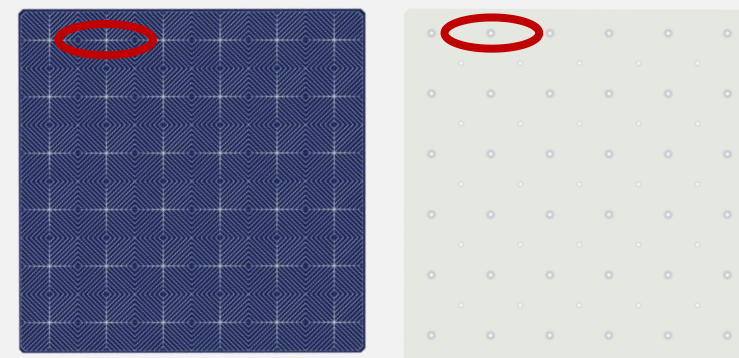
## Advanced Back Contact Technology

MWT (Metal Wrap Through) is an advanced back contact technology to increase solar cell and module efficiency by eliminating the busbar on the front side, and deploy both positive and negative electrodes on the rear side. It's named as MWT back contact technology.

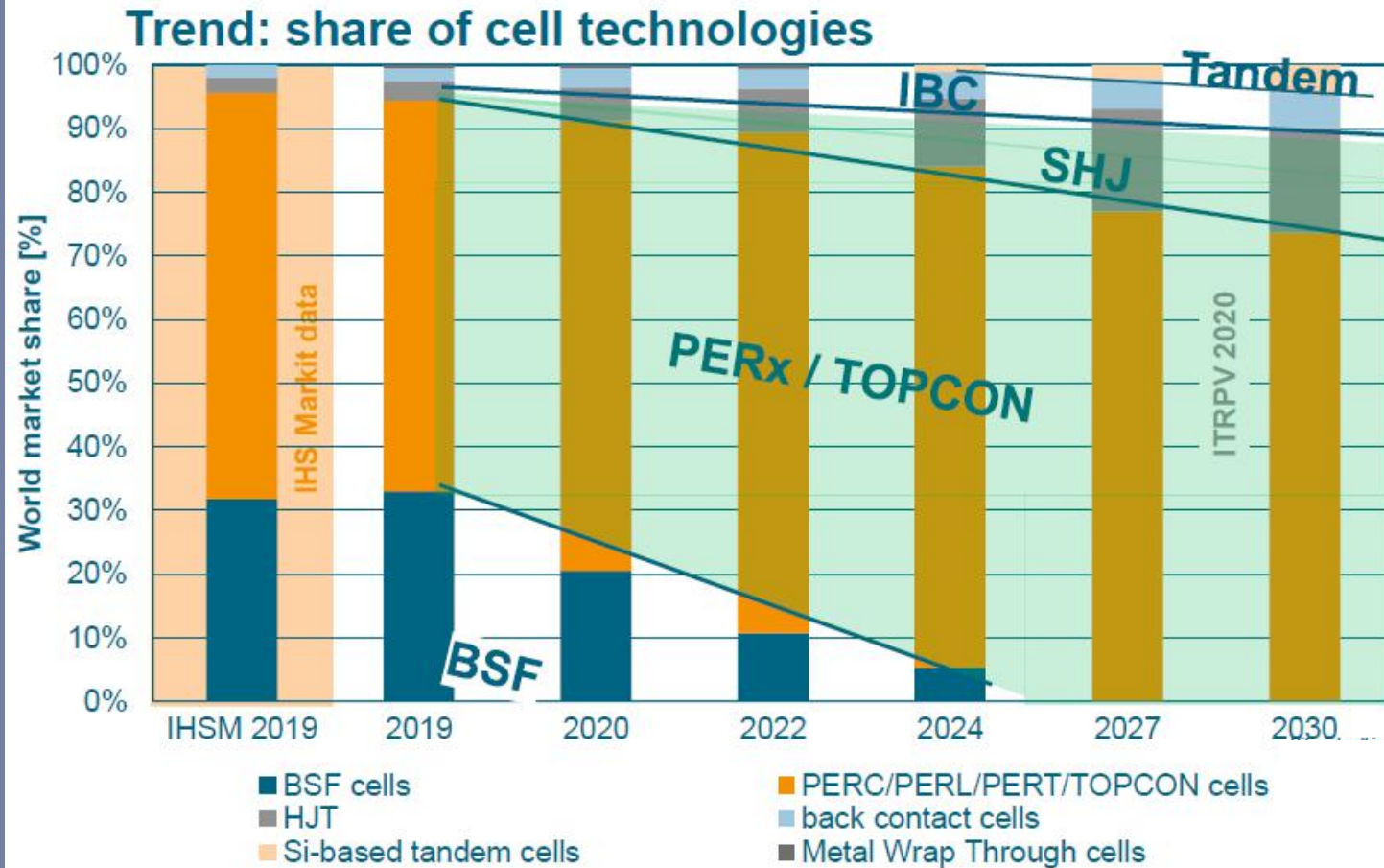
- **Without busbars** - 3% less shadow on the front surface
- **Higher efficiency** - More STC rated power compared with industrial average
- **Without solder ribbons** - Eliminating the degradation caused by welding stress and micro crack
- **Thinner silicon wafer** - Excellent flexibility for flexible products.
- **Technical compatibility** - Compatible with most of advanced technologies including PERC, TOPCon, HJT etc.



Cross section of MWT+PERC+SE



# The Most Compatible Technology Platform



## Great Compatibility of MWT

- BSF cells ✓
- Various passivated cells (PERC/PERL/TOPCon etc.) ✓
- HIT/HJT ✓
- Si-based tandem cells ✓

# Technology Comparison

## MWT technology

Positive and negative electrodes are both on the rear side of solar cell



**Structural Feature**



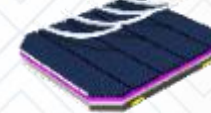
## Conventional technology

Positive and negative electrodes are located on opposite sides of the cell

Busbar-free design exhibits higher power output by decreasing shading area up to 3 %



**Cell Structure**



The main busbars increase more shaded area on cell surface, therefore the power output is limited

Cells are connected through conductive foil without soldering, the 2D encapsulation structure reduces the series resistance and module operating temperature, achieving higher reliability



**Module Encapsulation**



Cells are connected by string ribbons which will cause strain and micro-crack, resulting instability and power degradation

# Intrinsic Advantages from MWT Structure



## 1. Better heat dissipation due to metal foil:

- a) Nominal Operating Cell Temperature (NOCT)  $43 \pm 2^{\circ}\text{C}$ , lower than typical products
- b) Operating temperature  $\sim 3^{\circ}\text{C}$  cooler than typical modules ( $\sim 1.08\%$  more energy generation)

## 2. Improved low irradiance generation

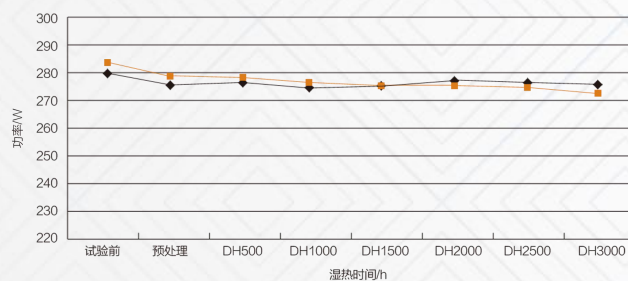
No busbar on the front, avoiding more sun shading when sunlight tilts (not ideal  $90^{\circ}$  direct light)

## 3. Great Reliability allows flexibility

Conductive adhesive between cells and metal foil provides more flexibility, reducing stress when the module in dynamic load (wind, snow, hail etc.)

## DH3000

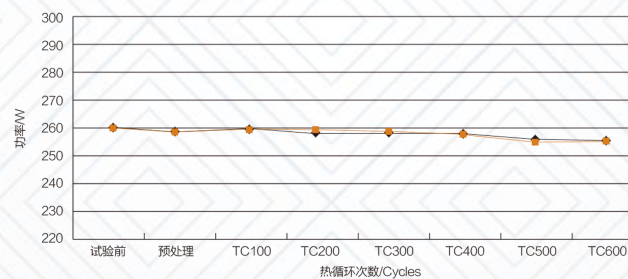
No apparent defect observed after DH3000test, final power output degradation lower than 1.3%.



—◆— PSPTC PV 20170434  
—■— PSPTC PV 20170435

## TC600

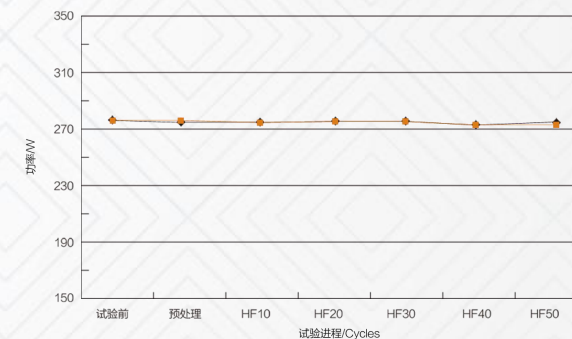
No apparent defect observed after TC600 test, final power output degradation lower than 0.5%.



—◆— PSPTC PV 20170436  
—■— PSPTC PV 20170437

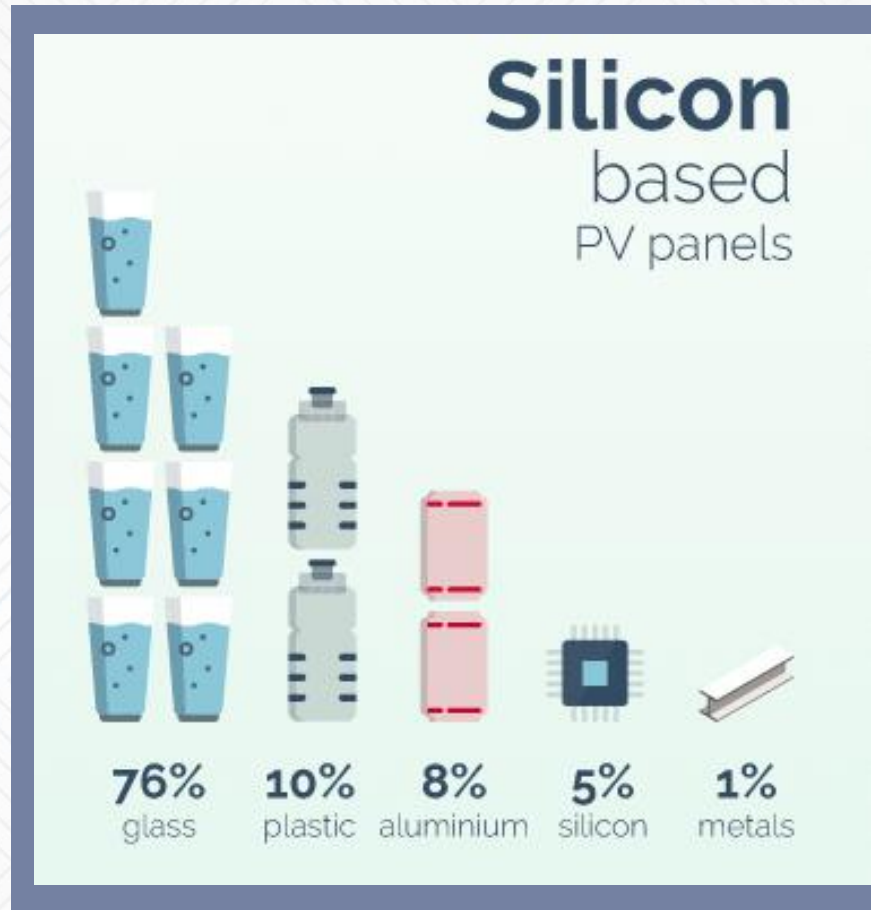
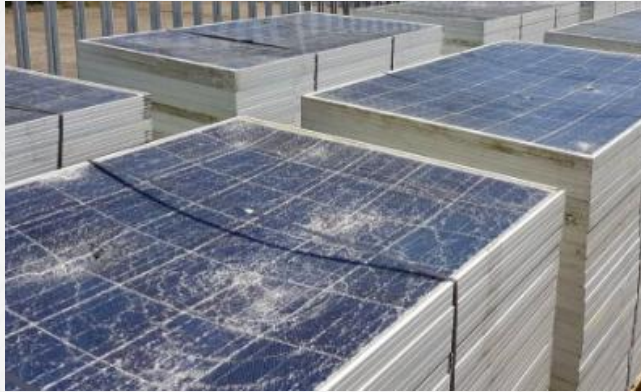
## HF50

No apparent defect observed after HF50test, final power output degradation lower than 0.5%.



—◆— PSPTC PV 20170438  
—■— PSPTC PV 20170439

# Environmental Concerns



Harmful for environment  
Raise recycling cost



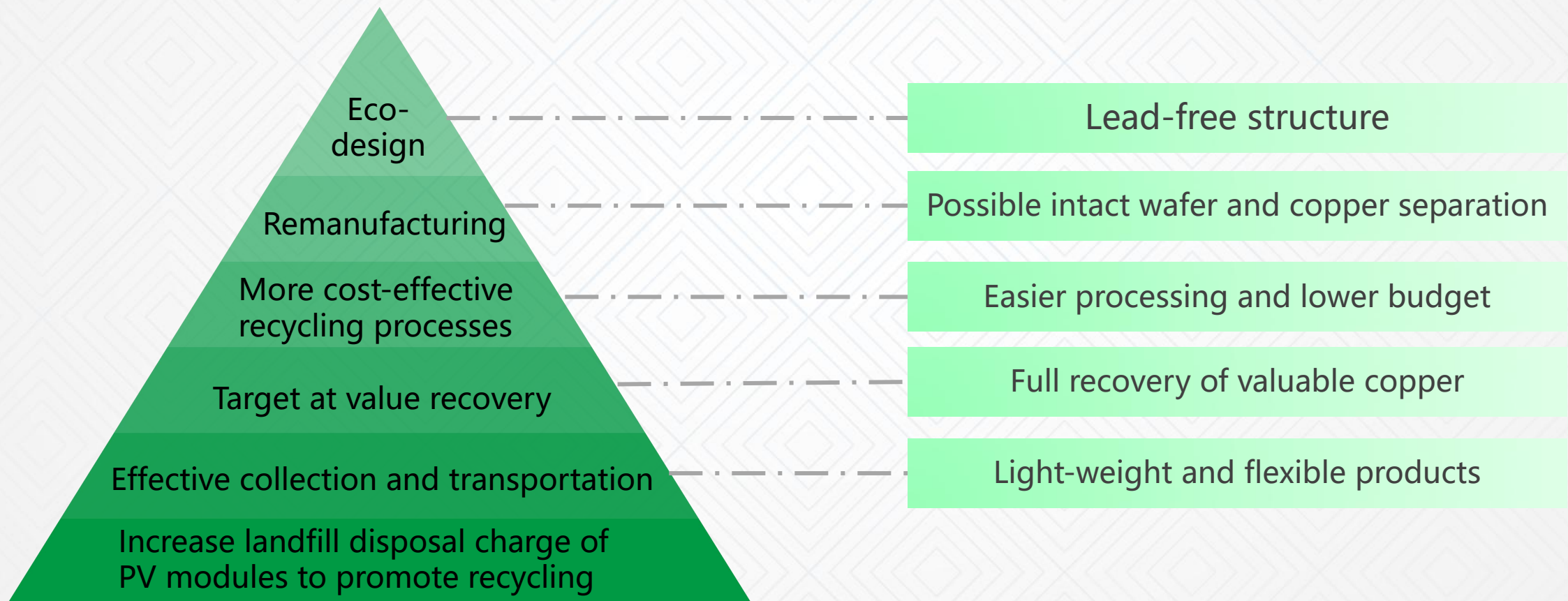
Conventional module  
contains toxic Lead(Pb)

**Environmental issue** – the recover of Lead in the modules is more and more important issue for PV application. In ribbon soldering connection modules, Lead is used in the soldering materials. However, the **conductive backsheet/paste is Lead free** in MWT design.

# MWT Merits in PV Recycling Economy

## Pathways towards sustainable recycling

## MWT merits in recycling economy



# Use of Thinner and Bigger Wafers

## 1、 Mono wafers of **160 $\mu\text{m}$** in thickness have been used

Nothing abnormal in efficiency and breakage rate

## 2、 Mono wafers of **140 $\mu\text{m}$** in thickness are under testing

A little drop in efficiency and rise in breakage rate, further optimization is in processing. Mass production in 2021 expected.

## 3、 Mono wafers of **120 $\mu\text{m}$** in thickness are possible?

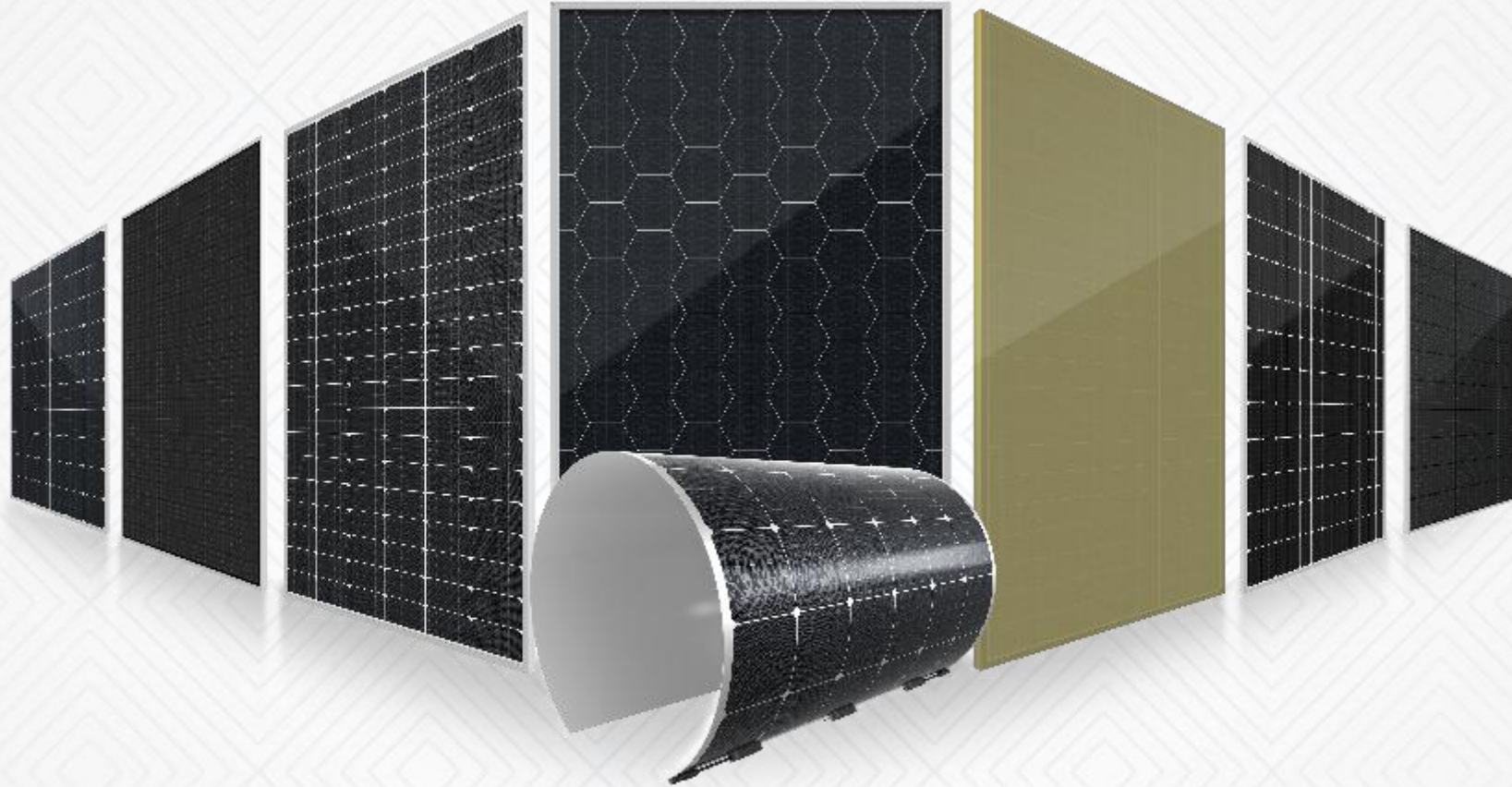
Mass production expected 2022.

## 4、 **162.75, 166 (M6)** wafer in use, **182 & 210** in short-term plan.

# Efficient Way for Cost Optimization

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# Product Overview



# S Series—Flexible Module

Various installation methods suitable for low-load rooftop



Light, Thin Design



Ultra Flexible



BIPV



High Efficiency

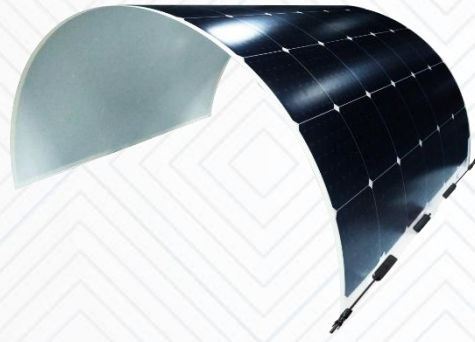
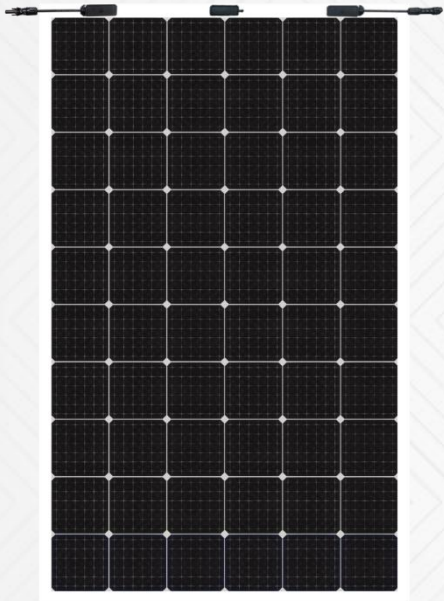


High Reliability

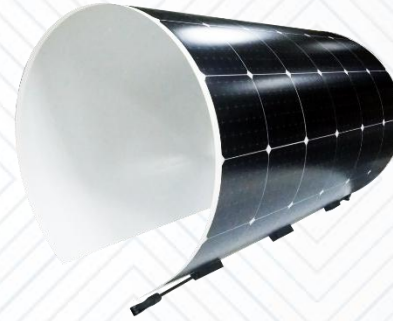


Lead Free

# Tests under Various Bending Radius



$r = 0.5 \text{ m}$



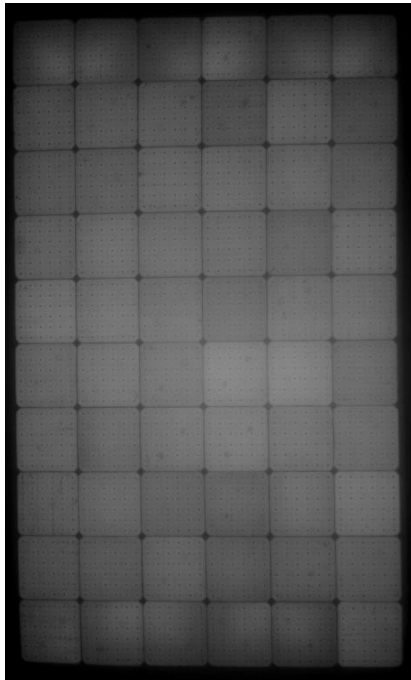
$r = 0.35 \text{ m}$



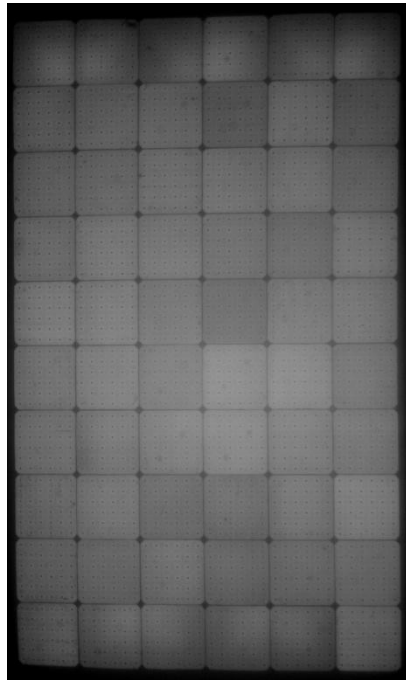
$r = 0.25 \text{ m}$

I-V and EL testing after keeping the modules under different radius for 10 minutes

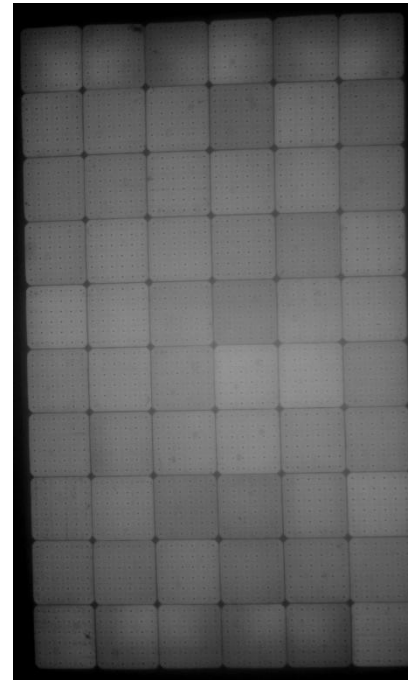
# EL Results after Bending



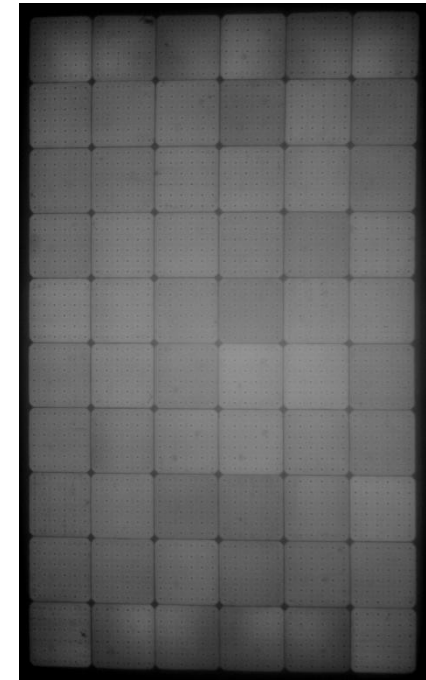
Initial EL



$r = 0.5 \text{ m}$



$r = 0.35 \text{ m}$



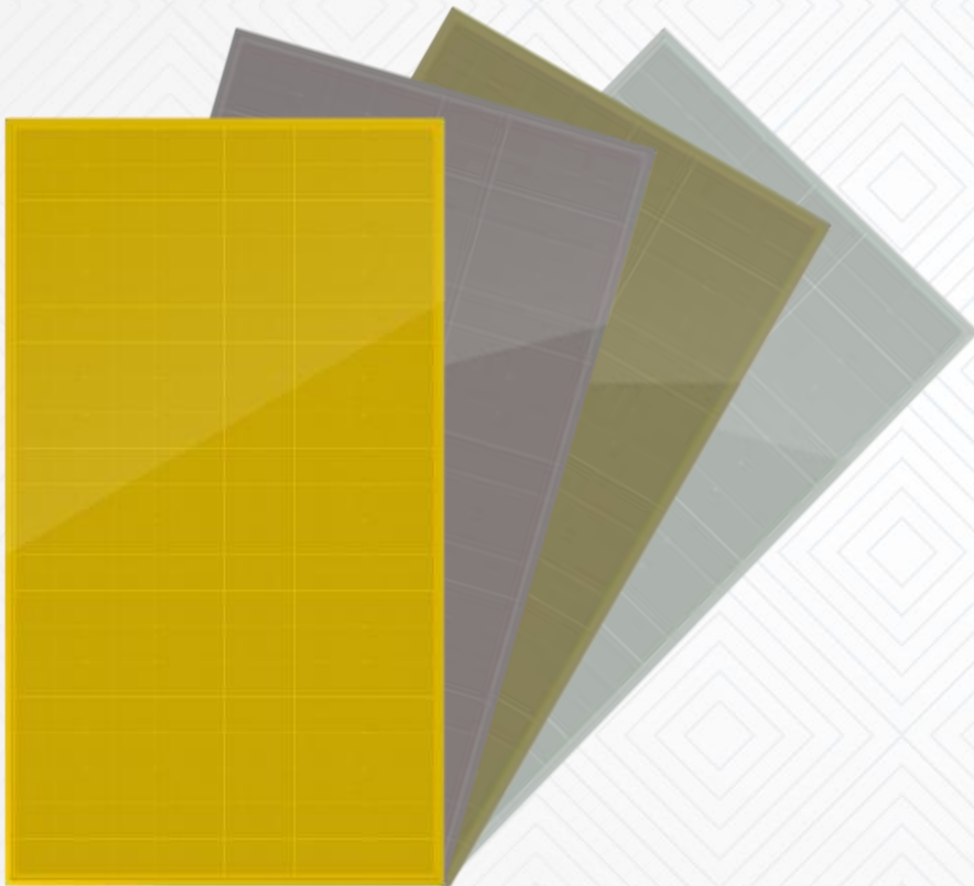
$r = 0.25 \text{ m}$

No micro-cracks observed when bending radius reaches 0.25 m

**Back Contact interconnection provides more flexibility among cells, encapsulation materials and backsheet.**

# Z Series—Polychrome Module

Suitable for building integrated PV



BIPV



Colorful Design



High Reliability



Superior Warranty



High Security



Lead Free

# Value Proposition



## High Efficiency

Less shading, higher efficiency

More STC rated power compared with industrial average



## High ROI (return on investment)

Reducing LCOE

Bringing more long-term return on investment



## High Reliability

First year degradation less than 2%

Over 82% output power guaranteed within 30 years



## Aesthetic Design

Recognizable busbar-free design

Unique and graceful finger pattern on the solar cell surface

Customized pattern design available



## Superior Warranty

The only single-glass module with 30-year power warranty  
reinsurance by LLOYD'S & PICC worldwide



## Lead Free

Achieving lead-free by using conductive foil

Eco-friendly recycling



# Sunport Power

— Innovation Changes The World —