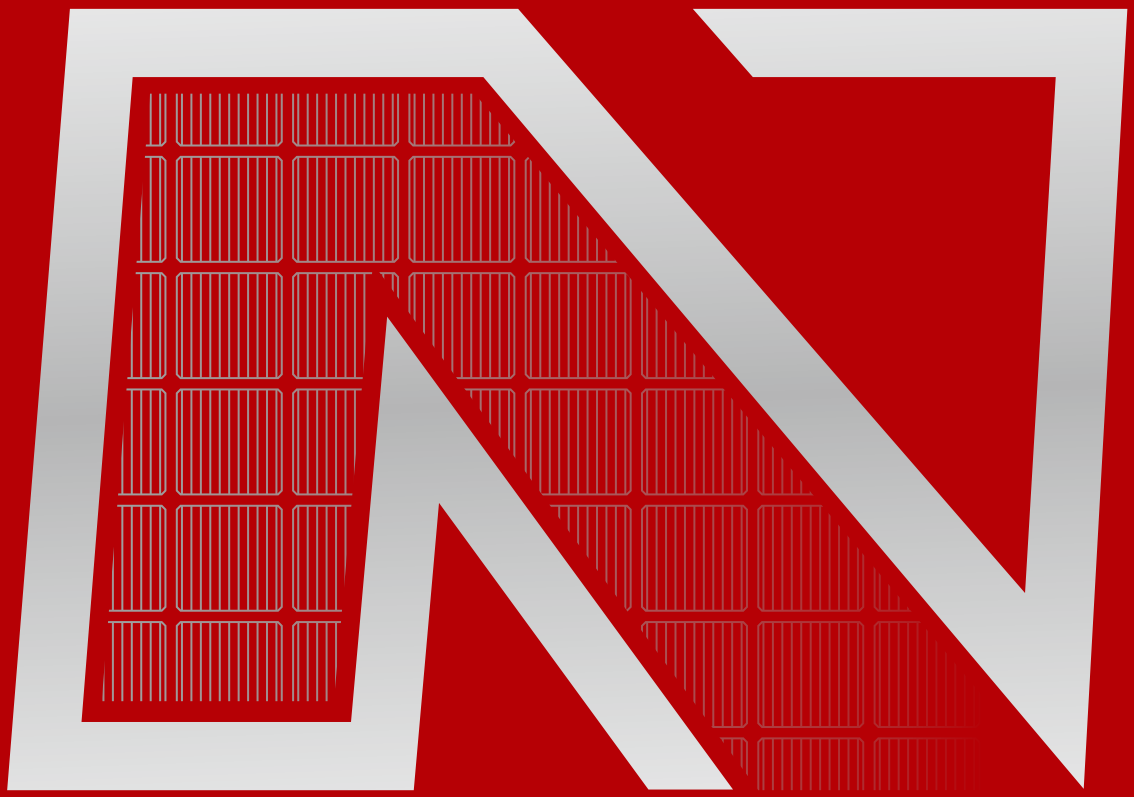
中来股份
JOLYWOOD

N TYPE

SAME SUNSHINE MORE VALUE

PRODUCT BROCHURE



ABOUT JOLYWOOD SOLAR

Jolywood (Taizhou) Solar Technology Co., Ltd. was established in 2016 as a subsidiary of Jolywood group, is located in Jiangyan Economic Development Zone, Taizhou City, Jiangsu Province. The company's registered capital is 2.33 billion Yuan and the total assets are 4.855 billion Yuan, and the company's credit Grade is A. As a leader in the industrialization of N-type bifacial solar cell technology, is the world's largest and the first Chinese enterprise to foucs on TOPCon bifacial solar cells. The n- TOPCon Bifacial Cell Production Capacity is 3.6GW, n-TOPCon Bifacial Module Production Capacity 3GW, n-IBC Cell Production Capacity 150MW. It is the national high-tech enterprise, the backbone enterprise in the industry and the only enterprise in the industry that has won the double honors of "National Green Factory" and "National Green Supply Chain Management Demonstration Enterprise". Jolywood was listed at the Tier One brand by Bloomberg New Energy Finance and covered by MunichRe reinsurance.

The company has established Jiangsu Province efficient photovoltaic engineering technology research center, provincial enterprise technology center, provincial intelligent factory and CNAS certified Photovoltaic Testing Center. Passed the national intellectual property certification, the company has applied for 157 patents and authorized 72 patents, including 20 invention patents. The company has completely independent intellectual property rights in terms of the technology of solar cells. The company's J-TOPCon2.0 solar cell efficiency reached 24.5%, passed Appraisal of scientific and technological achievements in Jiangsu Province. The company's Niwa series TOPCon products are characterized by its high power, high reliability, high bifacial rate, low degradation, low temperature coefficient and a series of advantages which are deeply praised by customers. Jolywood has delviered more than 4.1GW N-Type solar modules in more than 50 countries.

3.6GW
n-TOPCon
Bifacial Cell
Capacity

3GW
n-TOPCon
Bifacial Module
Capacity

150MW
n-IBC
Cell Capacity

Leader of N-type Bifacial Technology

TIER 1 Bloomberg NEW ENERGY FINANCE

全球新能源企业500强
Global Top 500 Energy Enterprise

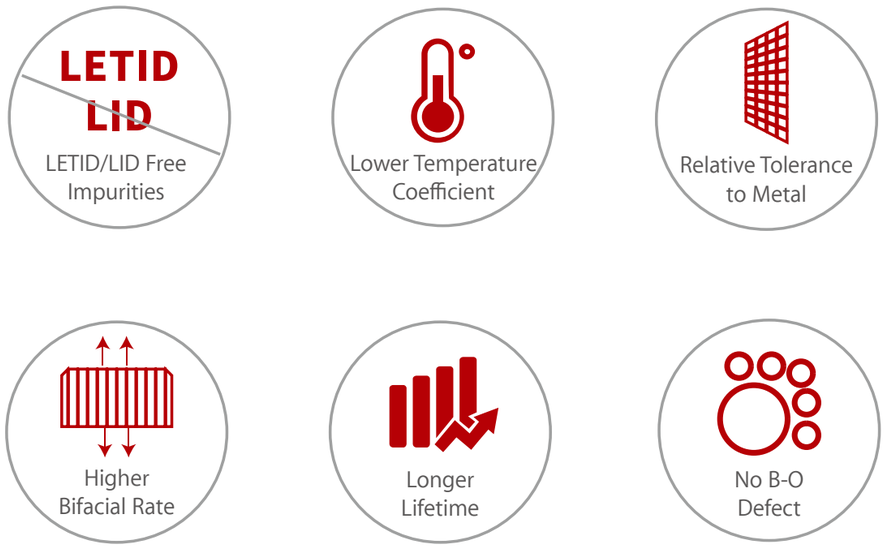
高新技术企业
Qualified High-tech Enterprise

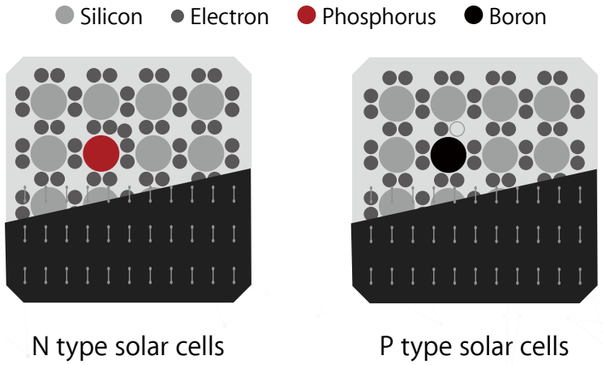
国家绿色工厂
Qualified China Green Factory by MIIT

AWARD 2020

TOPCon TECHNOLOGY

Advantages of N Type Solar Cells



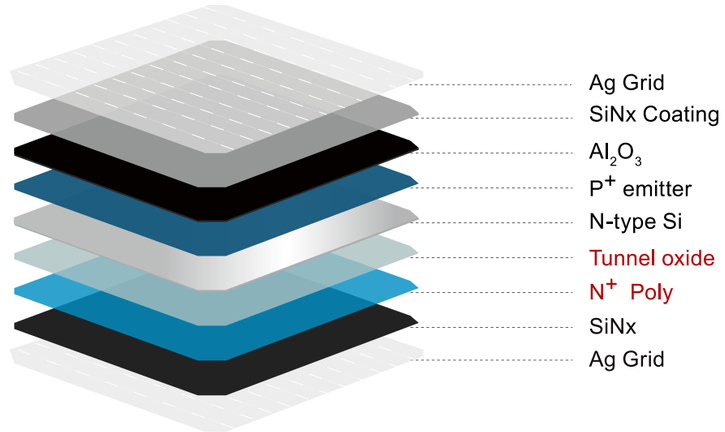


Comparing with P- type solar cells, TOPCon cells have longer lifetime, lower degradation and higher potential of efficiency enhance.

Advantages of N Type Solar Cells

Passivated contact structure of J-TOPCon 2.0:

- Good interface passivation effect & field passivation effect
- Most of the carrier selective funneling effect,raip carriers transport between absorption and doped layer.



Advantages of J-TOPCon 2.0

- Higher efficiency
- High bifacial rate
- Lower Temperature coefficient
- Lower degradation

Efficiency 24.5%

Temperature coefficient reaching -0.32%

Bifacial rate reaching 85%

Degradation in first year 1%

NIWA SERIES
SOLAR MODULES

Large-Size
Solar Wafer

700W
Higher Power

J-TOPCon 2.0

The worldwide first J-TOPCon 2.0 half-cut solar cell technology

12BB
multi-busbars

Nano-alloy backsheet

High reliability

Additional Power Generational Gain

At least 30-year product lifetime and bifacial design, more than 10-30% additional power gain comparing with the regular modules

Better Temperature Coefficient

Higher power generation under working conditions adopiting Passivating Contact Cell technology

ZERO LETID and LID

LETID
LID

N-type TOPCon solar cell technology has no LID and LETID naturally, can increase power generation

Better Weak Illumination Response

Higher power output even under low-light power generation conditions like smoggy or cloudy days comparing with the regular modules.

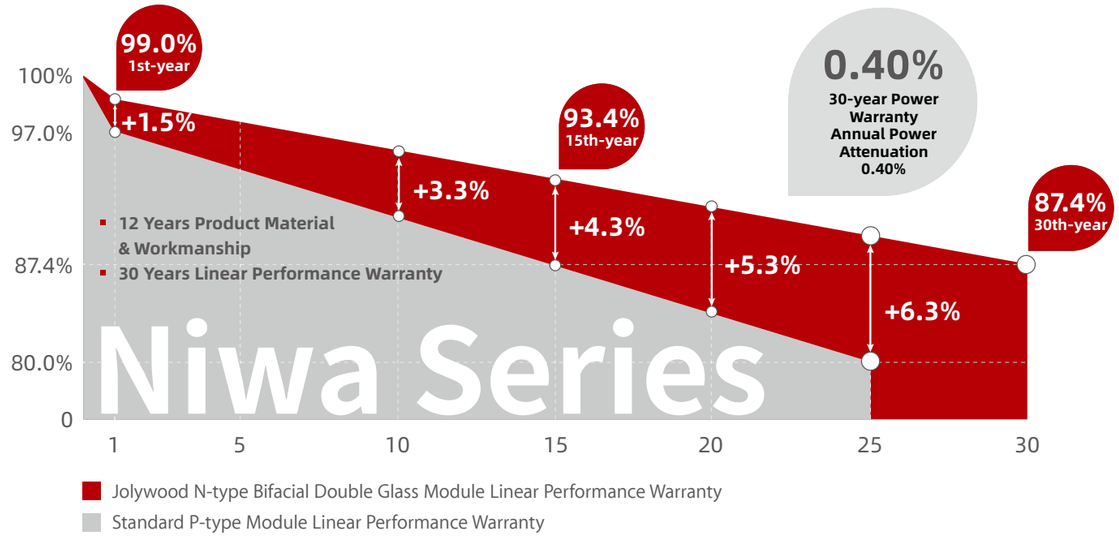
Low LCOE

Low
LCOE

Adopting high-power solar cell with 1500V technology to decrease the LCOE of the whole photovoltaic system to increase the ROI.

Wider Applicability

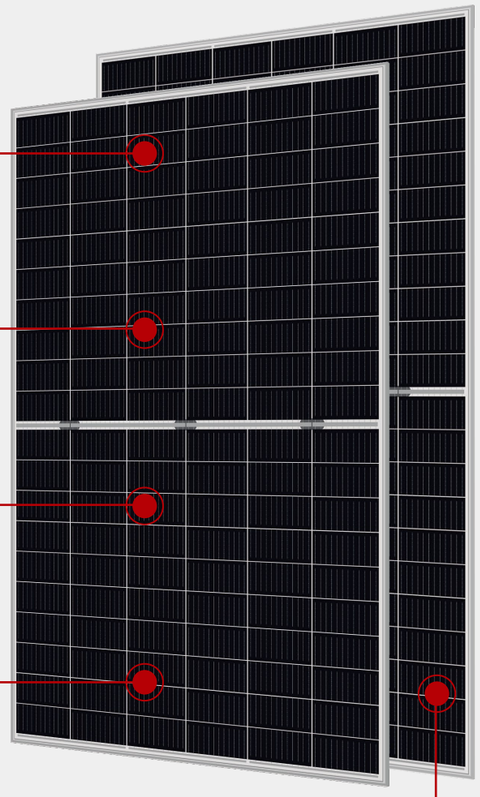
Wider application with bifacial design, like BIPV, Vertical installation, snowfield, high-humid area, windy and dusty area



Niwa Max

Based on the 210 large-size silicon wafer

60Cell 635W
66Cell 700W



Additional Power Generation Gain

At least 30-year product life & bifacial design, more than 10% - 30% additional power gain comparing with conventional module

ZERO LID (Light Induced Degradation)

N-type solar cell has no LID naturally, can increase power generation

Lower LCOE

High power and 1500V system voltage, saving BOS cost, improving rate of return on larger systems

Better Weak Illumination Response

Wide spectral response, higher power output even under low-light settings like smog or cloudy days

Better Temperature Coefficient

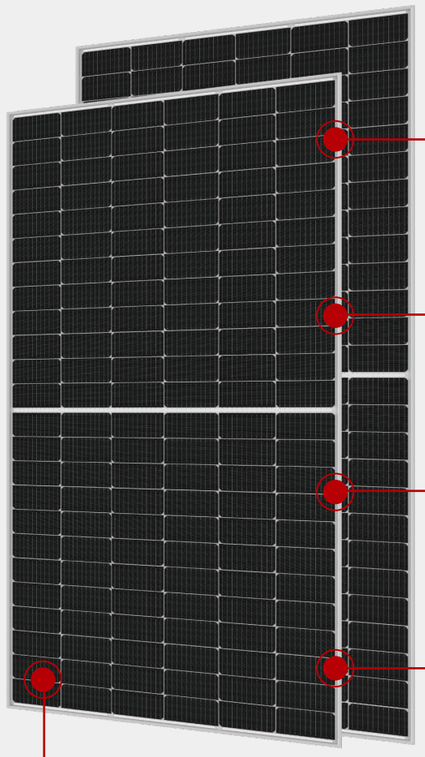
Higher power generation under working conditions, thanks to NTOPCon cell technology

Cell Technology:	NTOPCon	**Weight:**	35.5KG（60Cell）/38.0KG（66Cell）)Dual glass
Efficiency:	Up To 22.53%		32.5KG（60Cell）/35.5KG（66Cell）)Singe glass
Size:	2172mm×1303mm×35mm （60 Cell）	**Bifaciality:**	80±5%
	2384mm×1303mm×35mm （66 Cell）	**Temperature Coefficient:**	-0.32/℃
Glass:	Dual glass 2.0mm/Singe glass 3.2mm	**Voltage:**	1500V （IEC）

Niwa Super

Based on the 182 large-size silicon wafer

54Cell 430W/72Cell 570W
78Cell 615W



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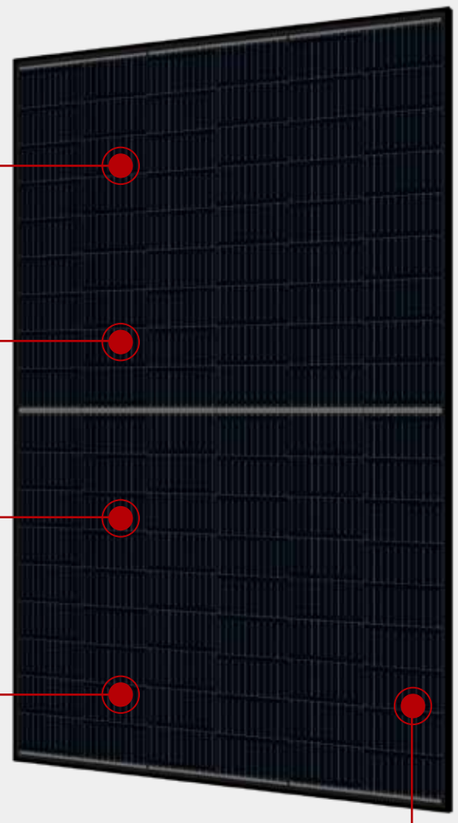
Cell Technology:	NTOPCon	**Weight:**	27.0KG(54Cell)/33.5KG(72Cell))/34.5KG(78Cell)) Dual glass
Efficiency:	Up To 22.00%		22.5KG(54Cell))/29.5KG(72Cell))/30.0KG(78Cell)) Singe glass
Size:	1728mm×1134mm×30mm/35mm （54 Cell）	**Bifaciality:**	80±5%
	2285mm×1134mm×30mm/35mm （72 Cell）	**Temperature Coefficient:**	-0.32/°C
	2470mm×1134mm×30mm/35mm （78 Cell）	**Voltage:**	1500V （IEC）
Glass:	Dual glass 2.0mm/Singe glass 3.2mm		

Niwa Black

Based on the
182 large-size silicon wafer
High power output up to
415w+



Additional Power Generation Gain

MBB technology reduces the distance between busbars and finger grid lines, improving reliability and increasing output

ZERO LID (Light Induced Degradation)

N-type solar cell has no LID naturally,
can increase power generation

Lower LCOE

High power and 1500V system voltage, saving BOS cost, improving rate of return on larger systems

Better Temperature Coefficient

Higher power generation under working conditions, thanks to NTOPCon cell technology

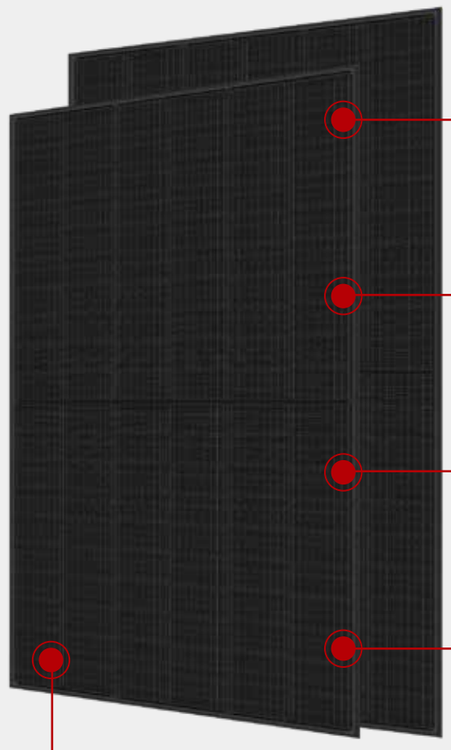
Outstanding Visual Appearance

Designed with aesthetics in mind,
thinner wires that appear all black at a distance

Cell Technology:	NTOPCon	**Weight:**	22.5KG
Efficiency:	Up to 21.25%	**Temperature Coefficient:**	-0.32/°C
Size:	1722mm×1134mm×35mm (54Cell)	**Voltage:**	1500V (IEC)
Glass:	3.2mm		

Niwa Black

Based on the
166 size silicon wafer
High power output up to
385w+



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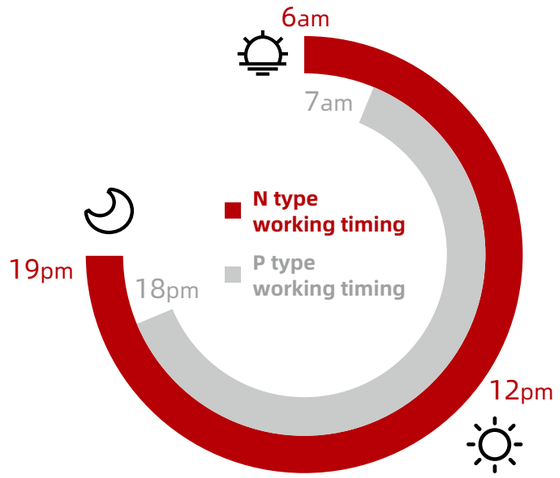
Cell Technology:	NTOPCon	**Weight:**	Dual glass 24KG / Singe glass 21.5KG
Efficiency:	Up to 20.90%	**Bifaciality:**	70±5%
Size:	1773mm×1046mm×30mm (60 Cell Dual glass)	**Temperature Coefficient:**	-0.32/°C
	1768mm×1042mm×35mm (60 Cell Singe glass)	**Voltage:**	1500V (IEC)
Glass:	Dual glass 2.5mm / Singe glass 3.2mm		

ADVANTAGES OF LCOE WITH N TYPE PV PANELS

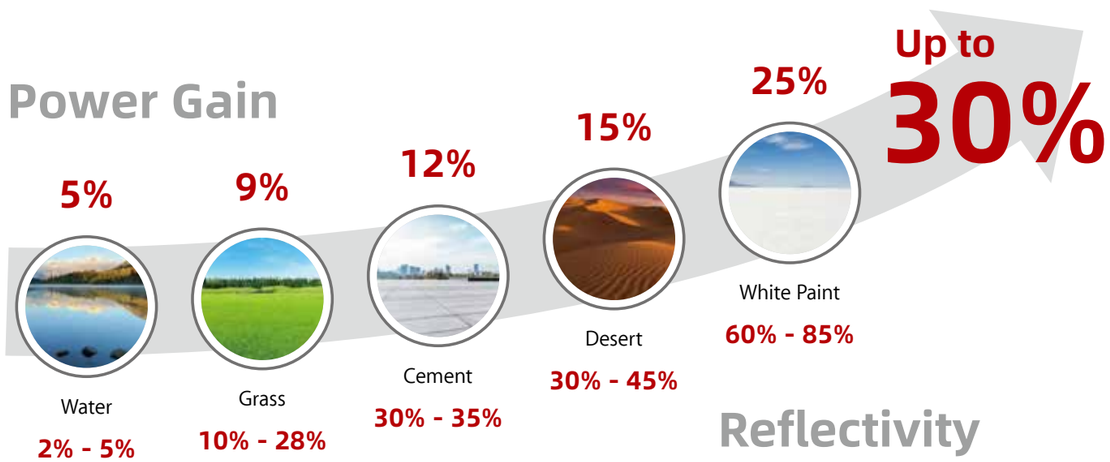
With the same solar irradiation, compare to P type PV panels, N type has a higher power generation.



EPC
O&M
System
+
Interest
−
Tax

Power Generation

Power Gain



GLOBAL COOPERATION PARTNERS

* The names of enterprises are arranged in alphabetical order

8MW
Arnhem Project
in the Netherlands

37MW
The Netherlands
solar energy park

11.75MW
Zonnepark Rilland N-Type bifacial
PV plant in the Netherlands

11.5MW
Bremen port Project
in Germany

4.15MW
Donaueschingen Project
in Germany

5.6MW
Starosynyavs'ky, 2019

5.6MW
Ukraine Stara Synyava
N-Type bifacial plant

4.2MW
Ukraine Fruzynvka
N-Type bifacial plant

320MW
United Arab
Emirates ACWA Project

125MW
Oman Project, 2019

125MW
Oman Project

458MW
Oman Ibri II Project

30MW
Shanxi, China, 2017,
Quanyang Top Runner Project

30MW
Quanyang Top Runner Project

29MW
Panda Solar Project

94.42MW
Jilin Top Runner Project

153MW
Qinghai UHV
PV Plant Project

90MW
Guizhou N-Type bifacial
PV plant

60MW
Guangxi N-Type bifacial
PV plant

64.64MW
Hebei, Haixing, 2019,
Top Runner Hebei Project

64.64MW
N-Type bifacial PV plant in Hebei

74.52MW
N-Type bifacial PV plant in Hebei

44MW
Poverty-relief Project in Hebei

104MW
Sihong Top Runner Project I

110MW
Sihong Top Runner Project II

JOLYWOOD GLOBAL PROJECT FOOTPRINT

Till the end of 2020, Jolywood N-type modules have installed 4.1GW globally

中来股份
JOLYWOOD

N TYPE
SAME SUNSHINE MORE VALUE

JOLYWOOD (TAIZHOU) SOLAR TECHNOLOGY CO.,LTD.
ADD：No.6 Kaiyang Rd., Jiangyan Economic Development Zone,Taizhou, Jiangsu Province, China,

TEL：+86-523-80612799
FAX：+86-523-80770837

www.jolywood.cn

WeChat
Official Accounts