

The analysis of cost advantage strategy on bifacial PERC cell



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Annual Cell Production Capacity

Production Capacity Target: **4.3GW** in 2017



Guangdong Aiko Solar

- **Founded : Year of 2009**
- **Headquarters : Foshan, China**
- **Total Investment > RMB 1.8 Billion**
Employees > 1,000
Cell Capacity: 1.65GW
- **Concentrated on researching, manufacturing and selling of solar PV cells**
- **Global leading solar cell company**
- **Long term strategic partnership with top-10 solar module manufacturers in the world.**



Make Solar energy the most economical clean energy

Zhejiang Aiko Solar



- A wholly owned subsidiary of Guangdong Aiko Solar
- Founded : Q1,2017
- Located : Yiwu, Zhejiang Province
- Total Investment : **RMB 6 billion**

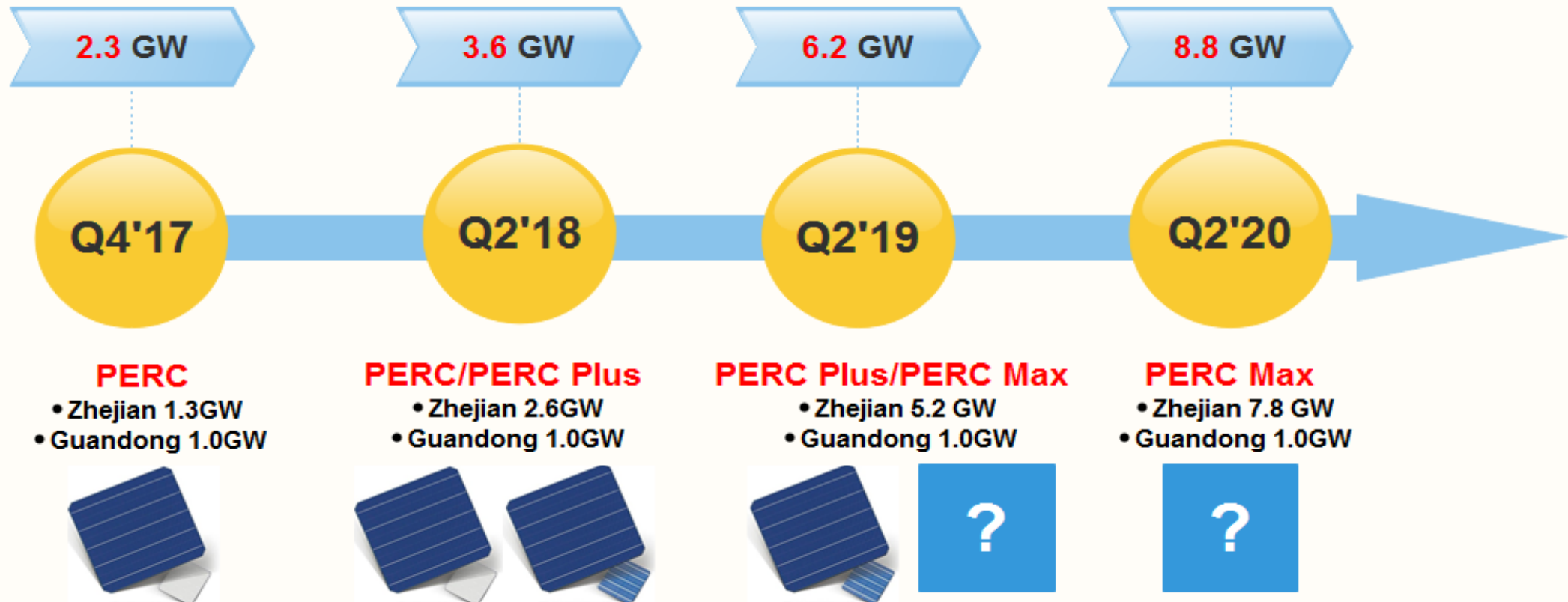
High-efficiency PERC cell production base with 8GW capacity

Phase I: 2.65GW capacity will be ready mass product in Q4,2017

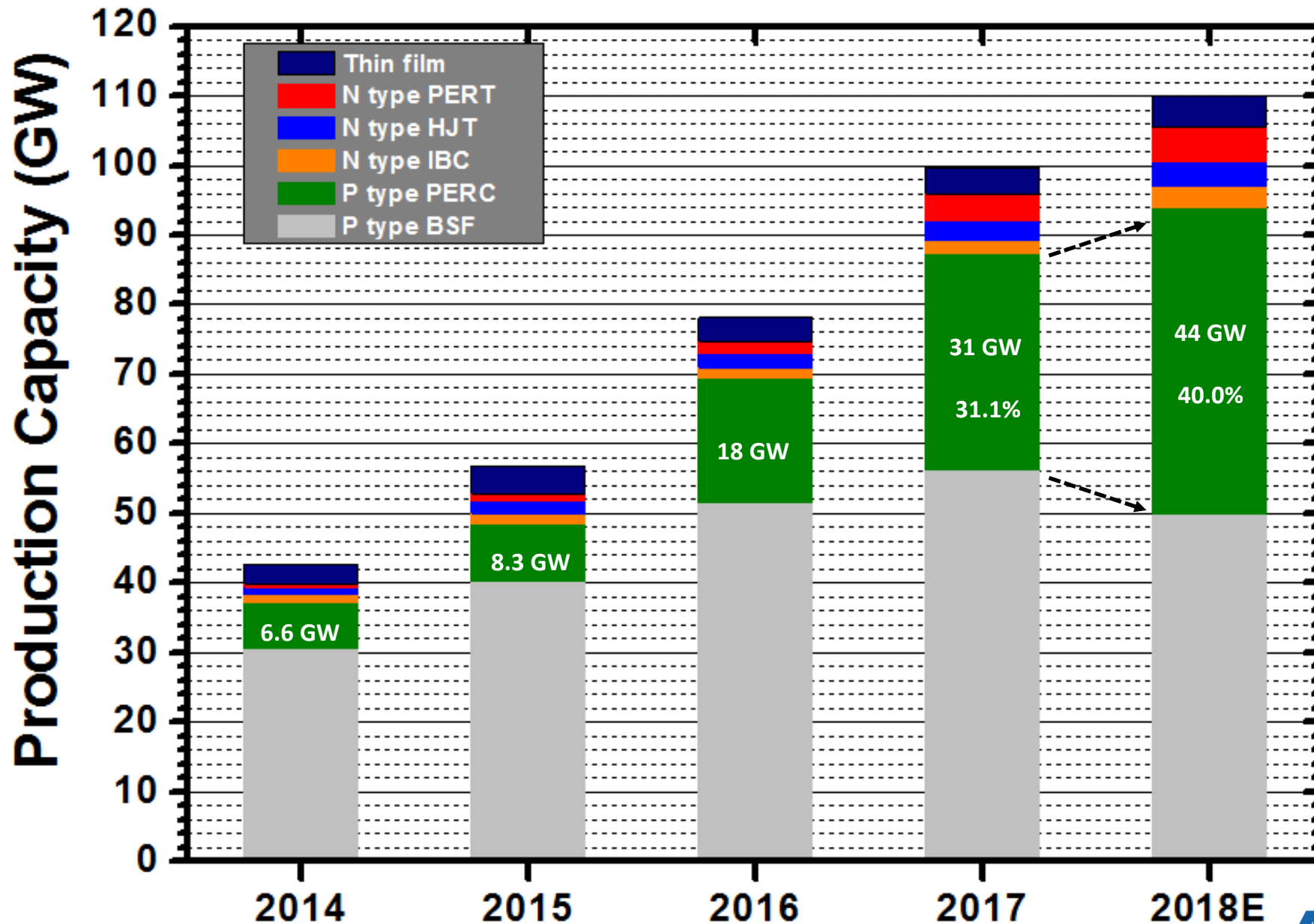
- The largest solar cell factory in the world.
- The most intelligent , automatic solar cell factory in the world

More efficiency, Competitive Cost, More power generation

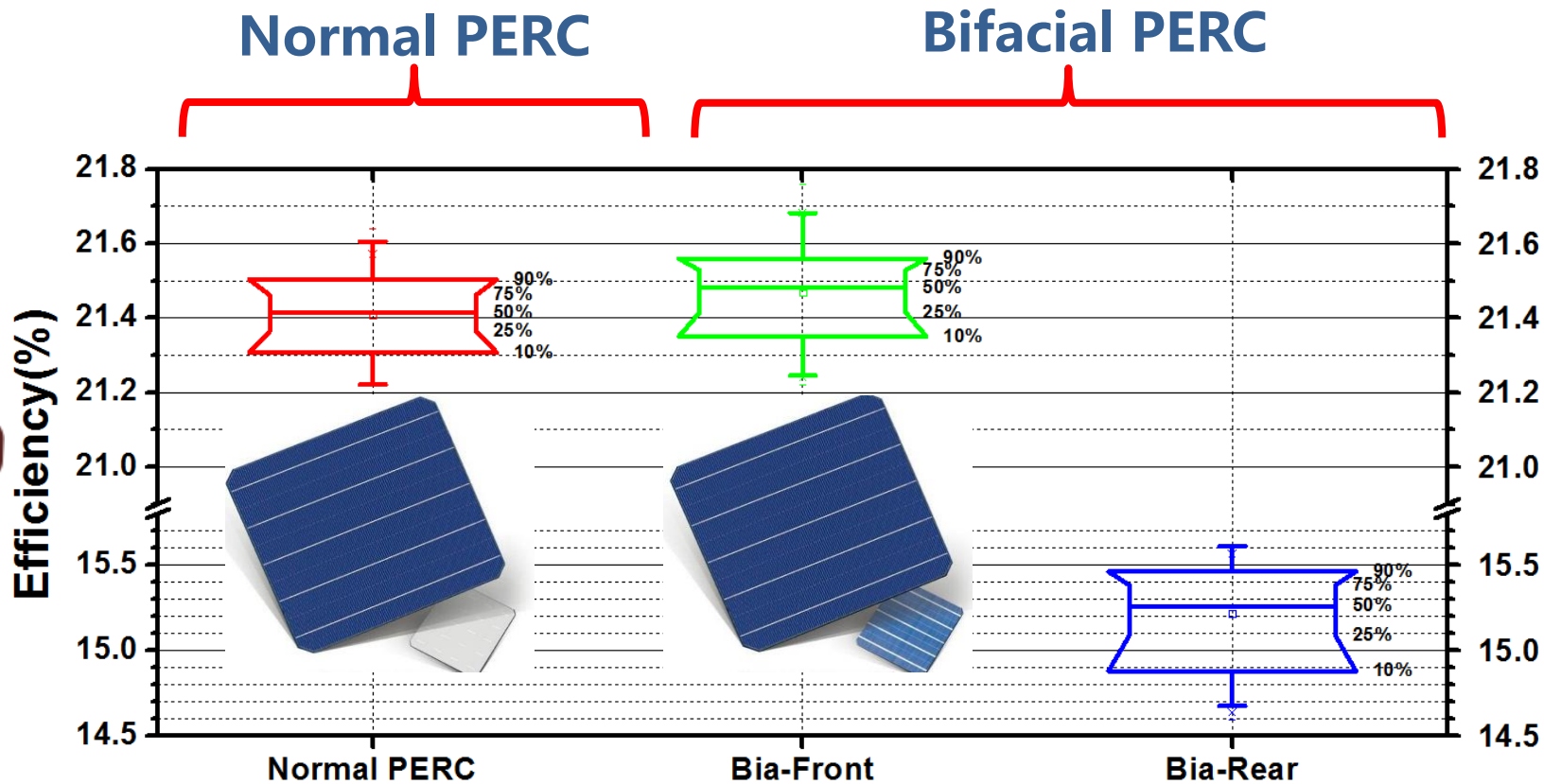
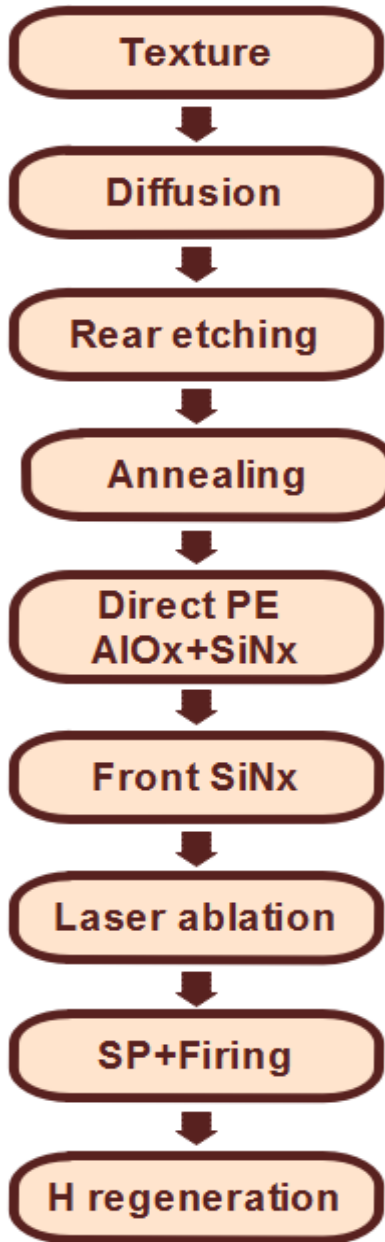
Capacity Plan of Aikosolar



Distribution of Solar Cell Capacity

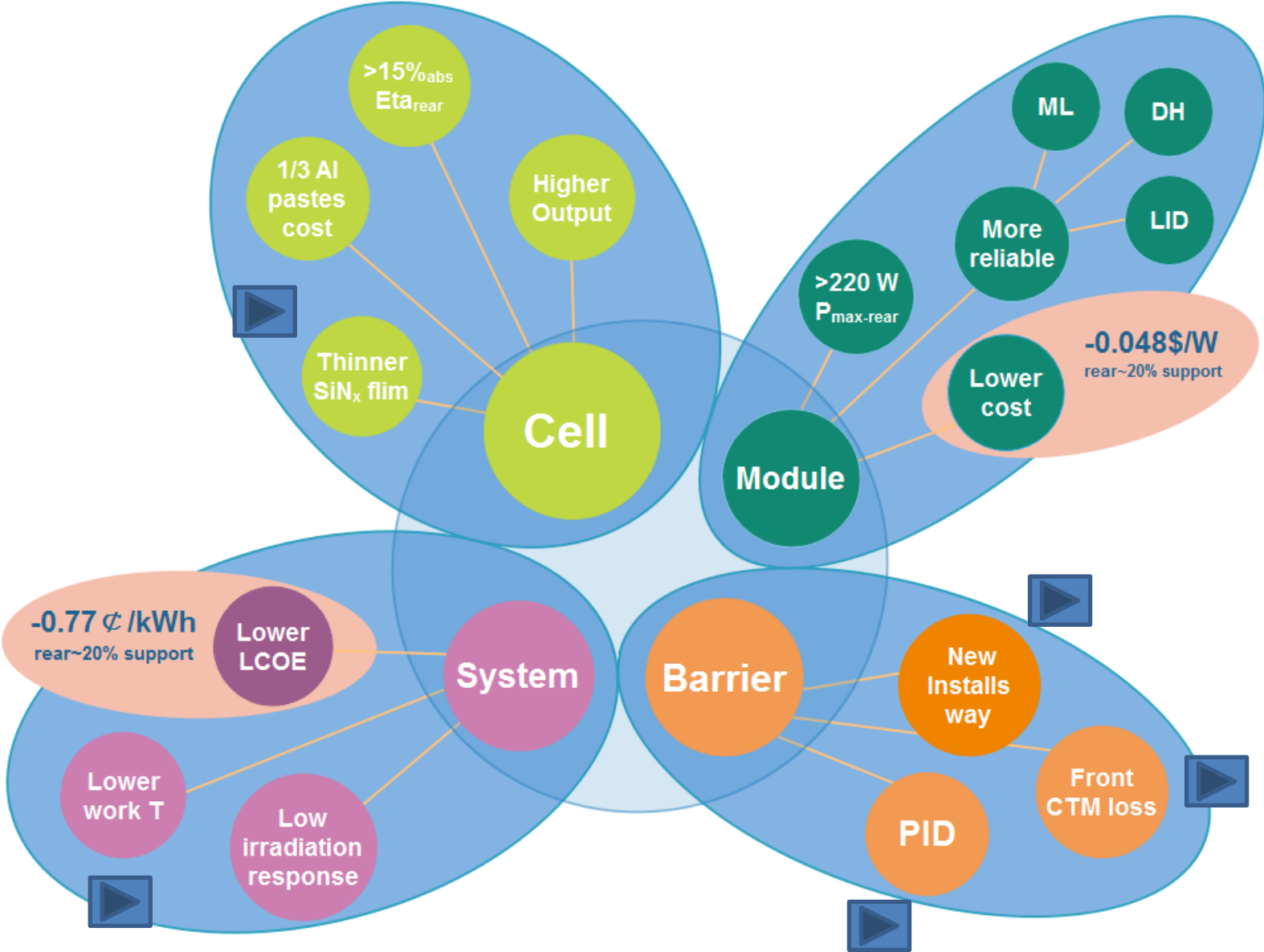


PERC Process Flow



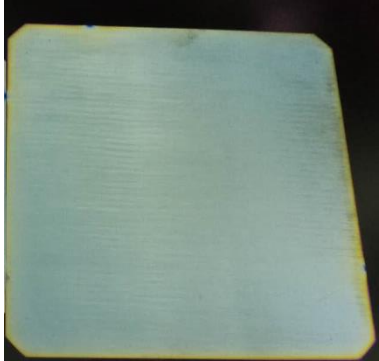
- PID < 3% (-1000V, 85 °C & 85%RH, 192H)
- LID < 1.5/2.0 % (20/60 KWH)
- DH 1000 < 2%
- TC 200 < 3%
- CTM Loss < 2.5%
- 60-cell module ≥ 300W

Cost advantages on bifacial PERC



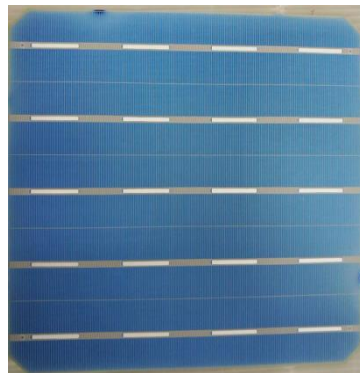
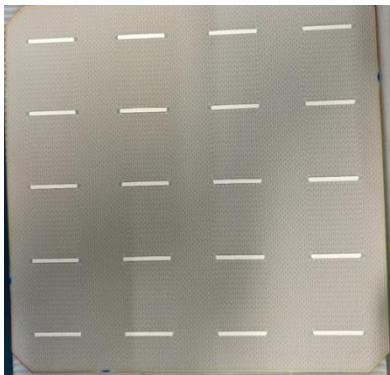
Lower cell cost

Rear capped films



80 % SiH_4/NH_3 cost reduced
20 % output gain

Rear design

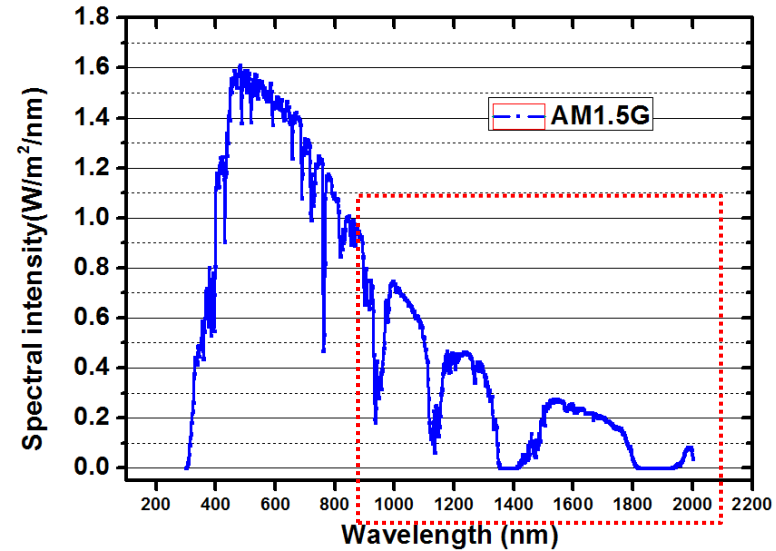
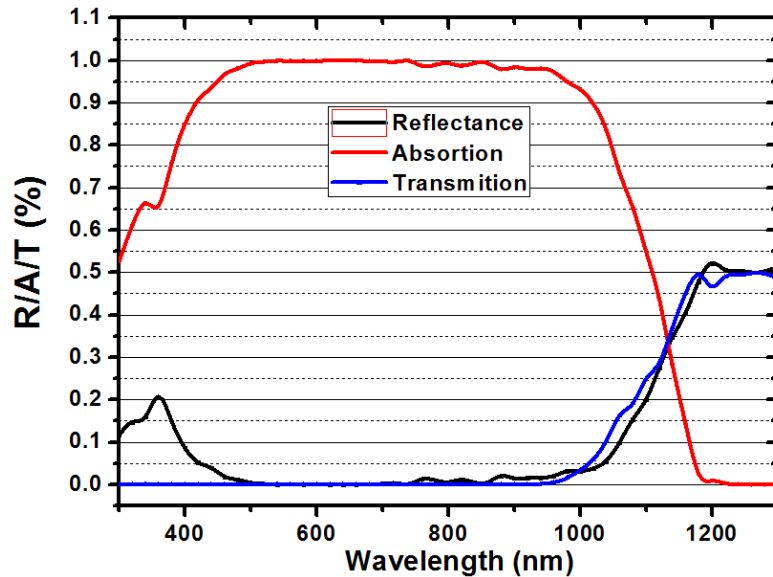


30 % Al paste cost reduced



Lower work temperature

$$P_{\max} \sim -0.3\%/^{\circ}\text{C}$$



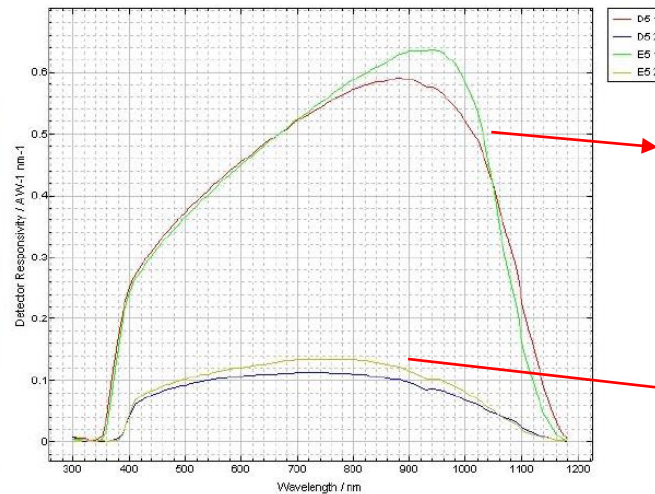
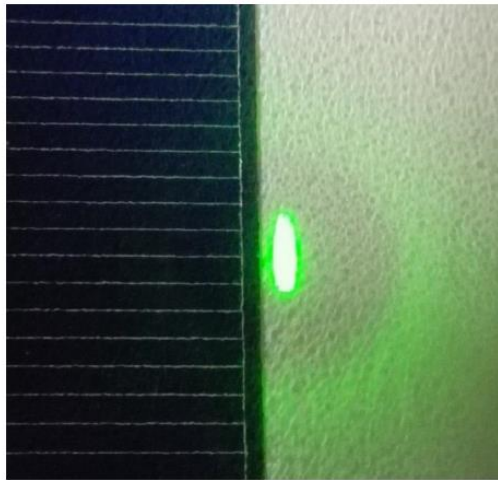
- ◆ Normal module_ IR light will be absorbed by Al film and transformed into heat
- ◆ Bifacial module_ IR light will penetrate the rear POE and glass

Lower T -> higher P_{\max} and lower degradation



CTM loss

The SR of module due to background reflectance



Light spot between fingers

Light spot on the background

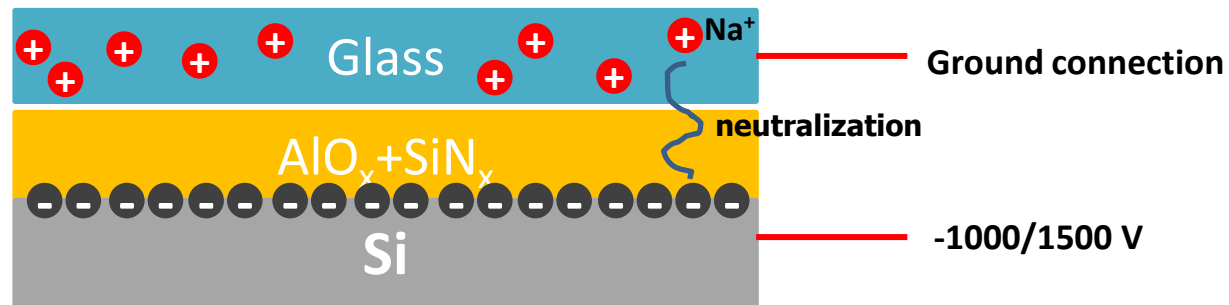
Comparison in the I_{sc} between glass and white background

Cell style	Module style	Cell					Module				
		V_{oc} (V)	I_{sc} (A)	R_s (ohm)	FF(%)	Eta (%)	V_{oc} (V)	I_{sc} (A)	R_s (ohm)	FF(%)	P_{max} (W)
Bifacial	Bifacial	0.6646	9.615	0.00347	78.40	20.51	39.50	9.385	0.496	0.7754	287.5
Nomal	Nomal	0.6630	9.544	0.00277	79.20	20.51	39.42	9.634	0.470	0.7680	291.7

➤ When replace the white background with glass , the CTM loss will increase due to I_{sc} loss



PID issue



- ◆ Positive ion will be scattered on rear capping film
- ◆ Negative charge density—decreased or even inverted

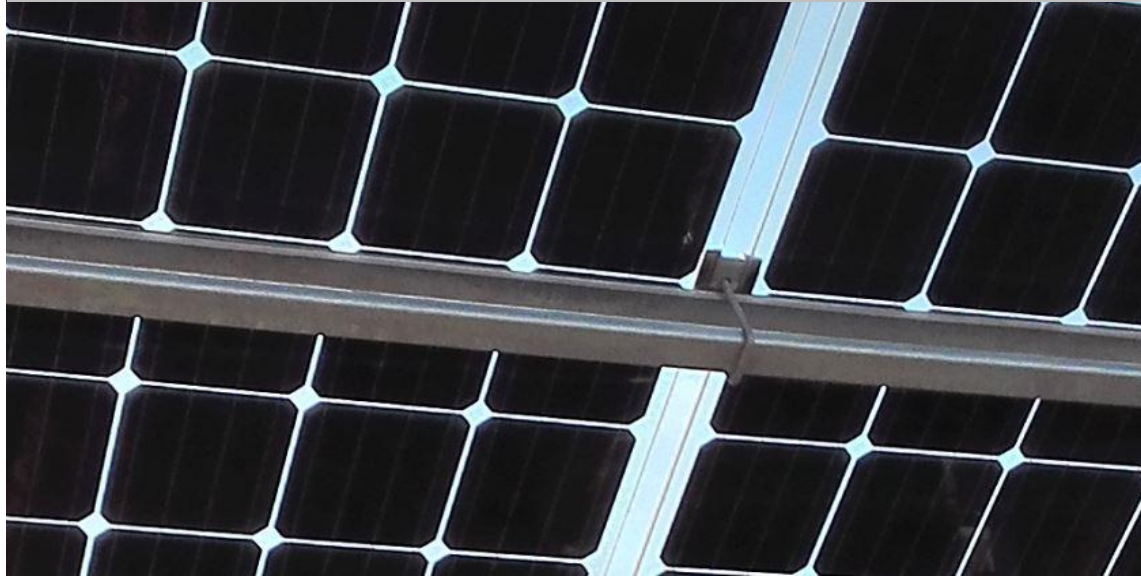
Material	96h PID (%)		Degradation (%) after one day light exposure	
	Front side	Rear side	Front side	Rear side
EVA	5.6	17.5	2.9	8.6
POE	1.1	2.4		

- ◆ PID issue can be solved by now by using POE and the cell process optimization are still going on
- ◆ The PID can be recovered under light exposure



Power loss as shadow

Conventional module design and installation :
>1/3 rear power loss due to shadow



Bifacial power killer :

Needle beam

Connecting box

Nameplate



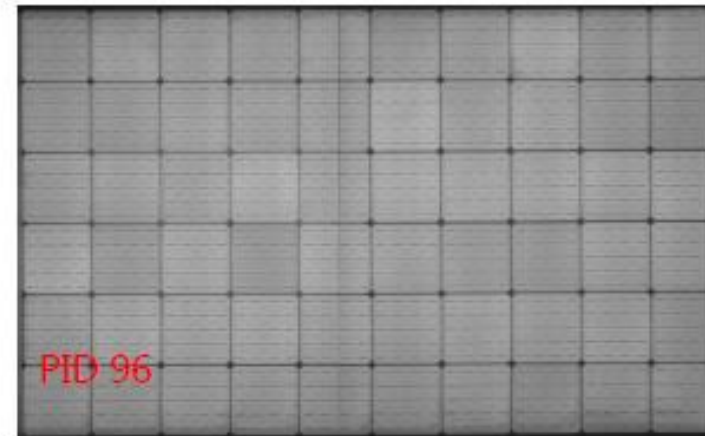
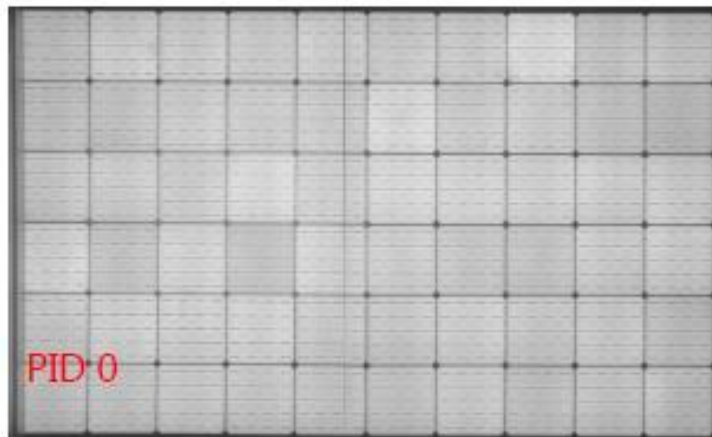
- ◆ Change the site of connecting box and nameplate
- ◆ New reliable way to install the bifacial module



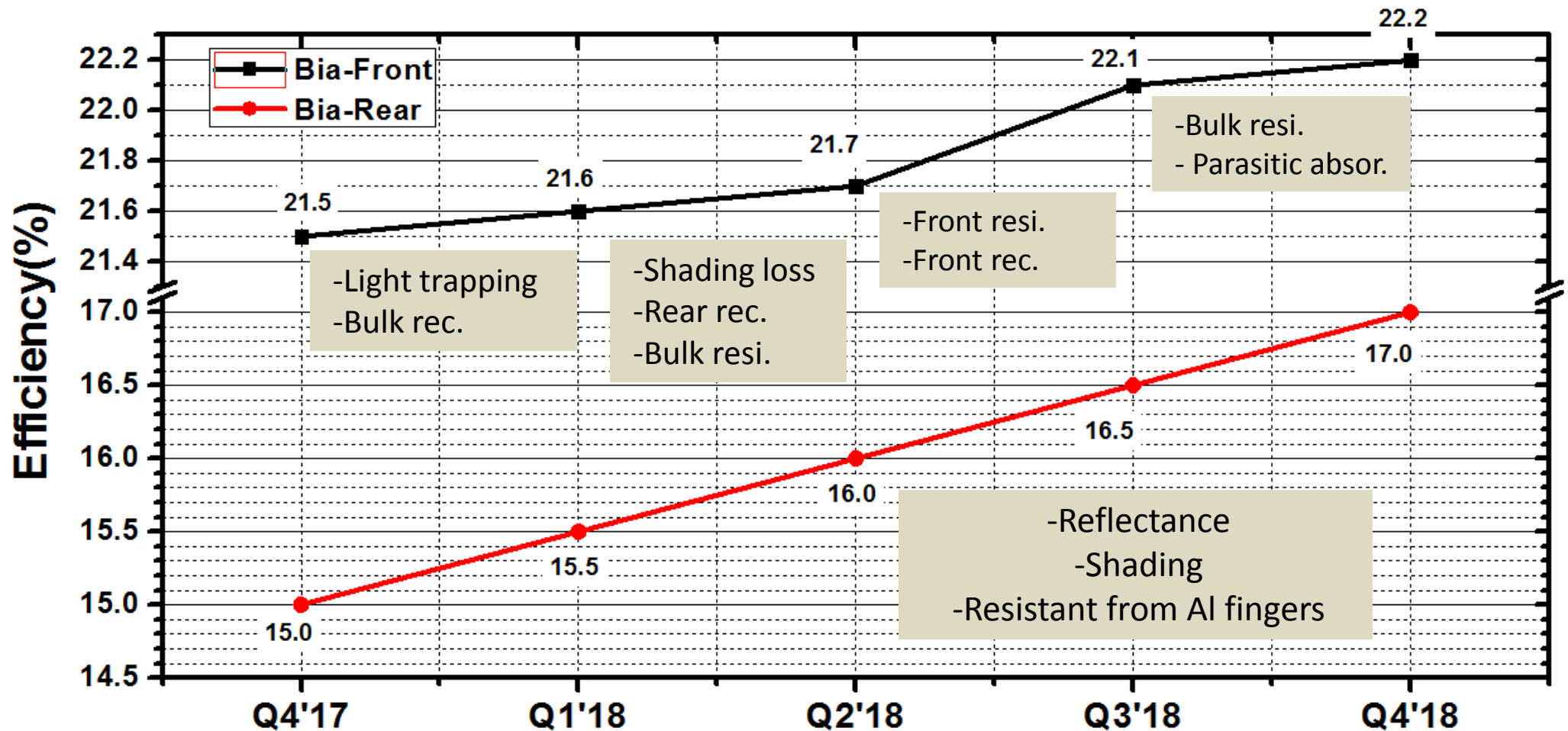
Performance of Aiko' bifacial cell

Data provided by Aiko' customer

Test items	Condition	Appearance	EL	Insulation	Module power (W)		Degradation or CTM loss (%)
					Before	After	
CTM loss	Process A	OK	OK	OK	304.5		2.03
	Process B	OK	OK	OK	310.5		0.08
LID	100 kWh	OK	OK	OK	-	-	Front-0.76 rear-0.60
TC	200 circles	OK	OK	OK	305.6	305.0	0.20
PID	96h, 85°C/85%H, -1500 V	OK	OK	OK	300.3	291.7	2.87



Roadmap—Bifacial PERC



Thank you!



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