



## EL3.0-Revolution of PV Quality

PV Guider  
Jay Lin/ Chief Consultant



PV Guider 您的光伏教練



## Content

■ Evolution of EL inspection

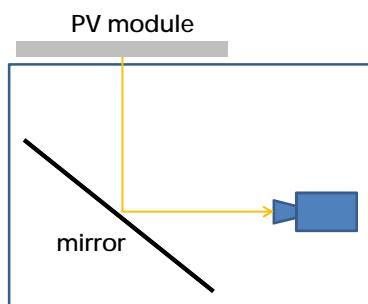
■ Latest EL technology

■ Revolution of PV quality





## EL1.0

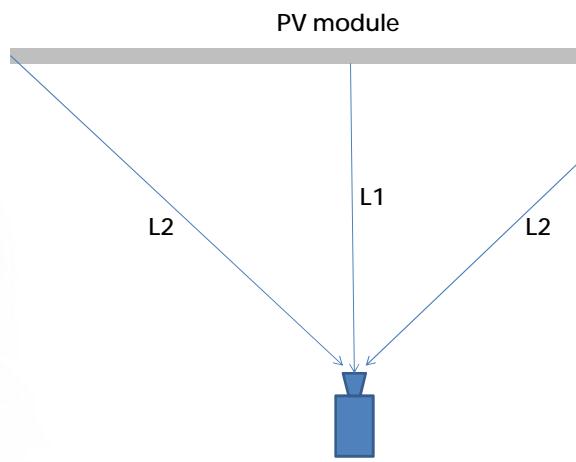


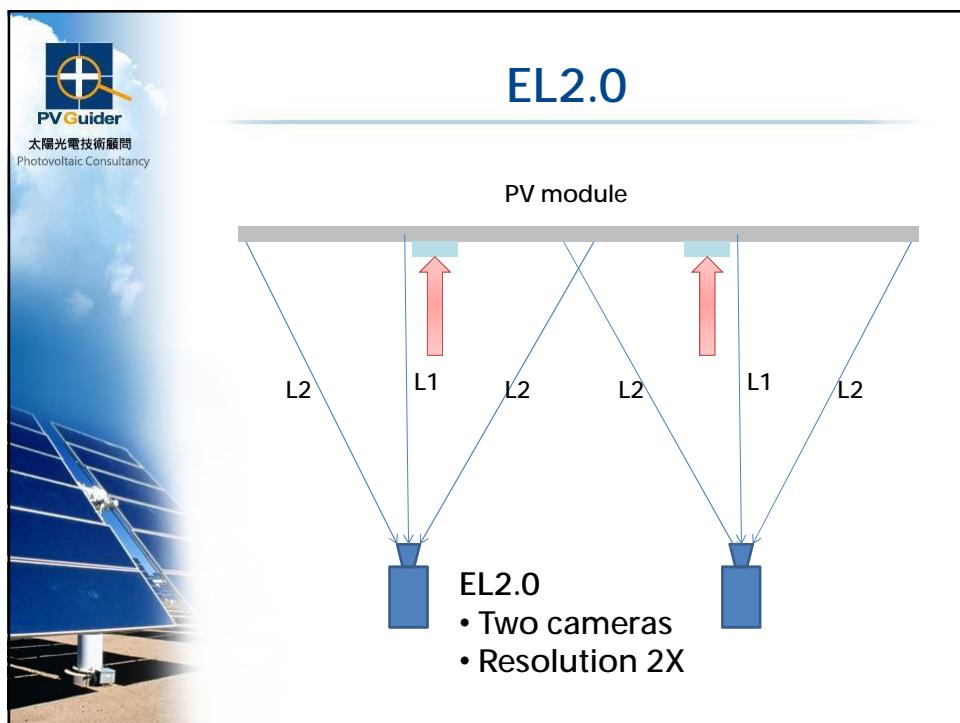
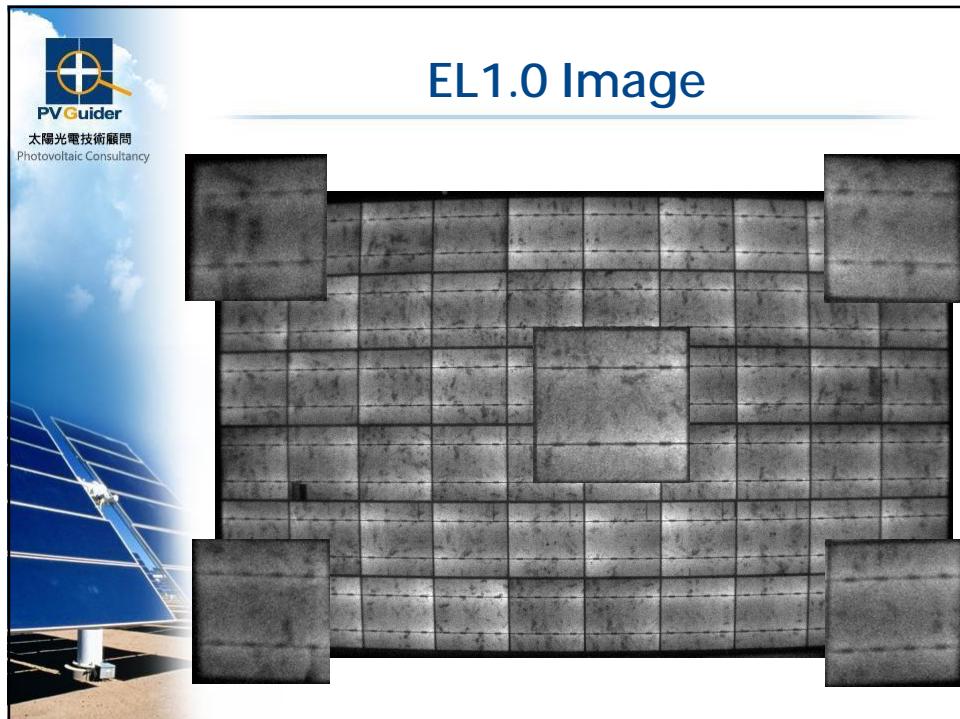
### EL1.0

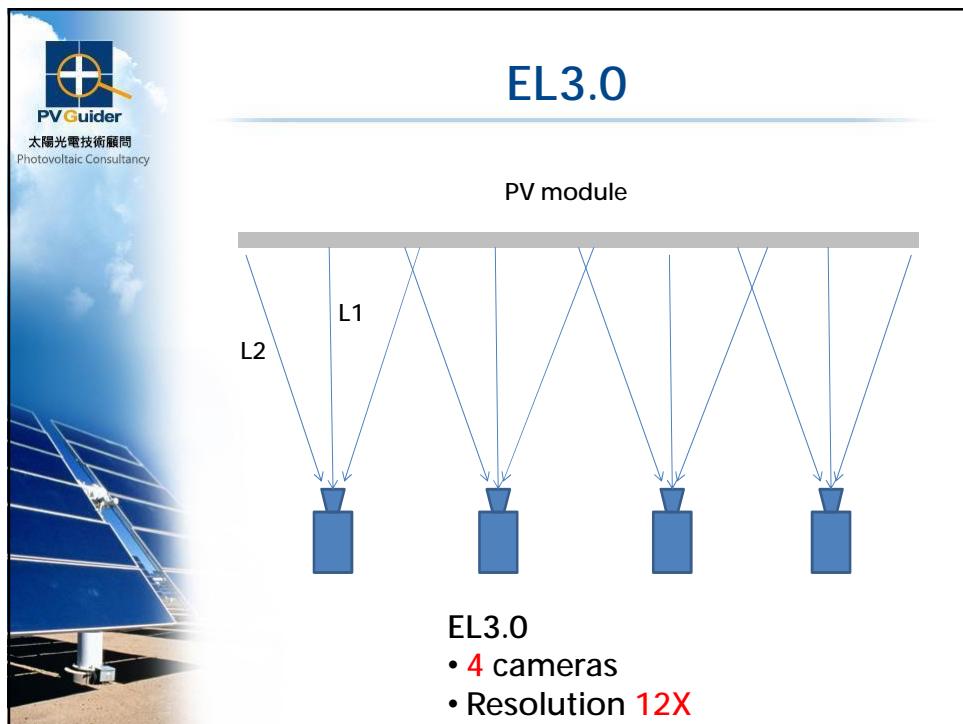
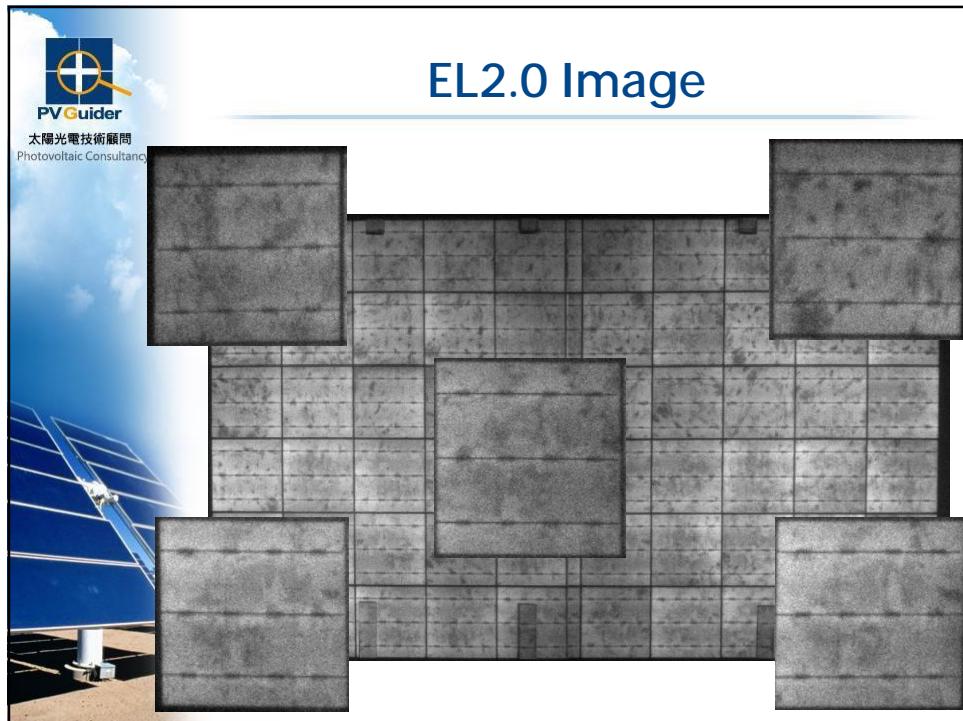
- Single camera
- Mirror reflection
- Resolution 1X

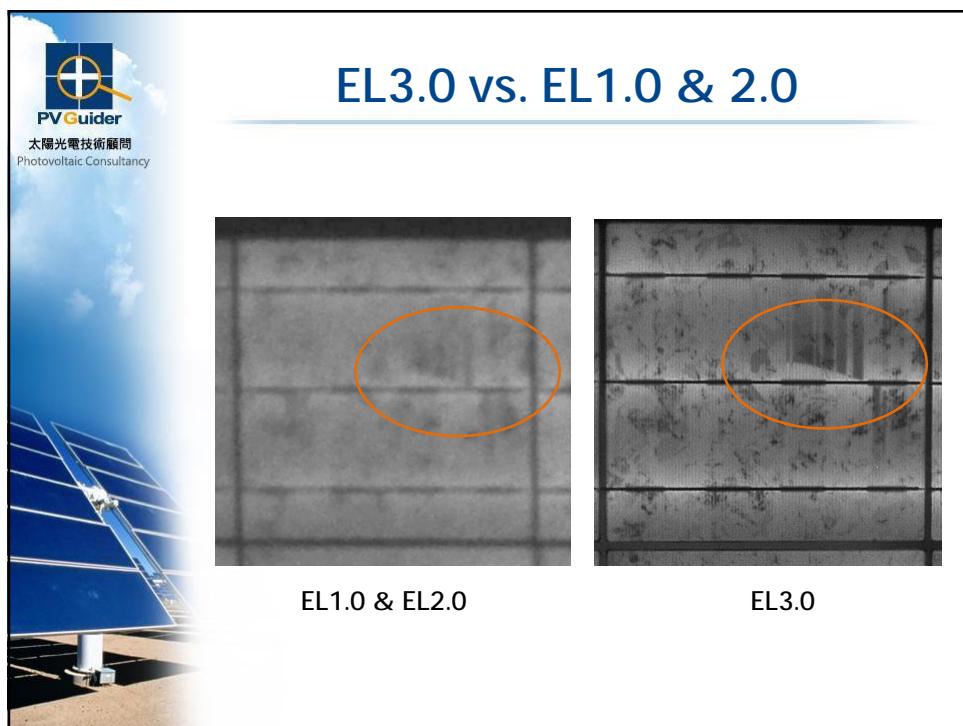
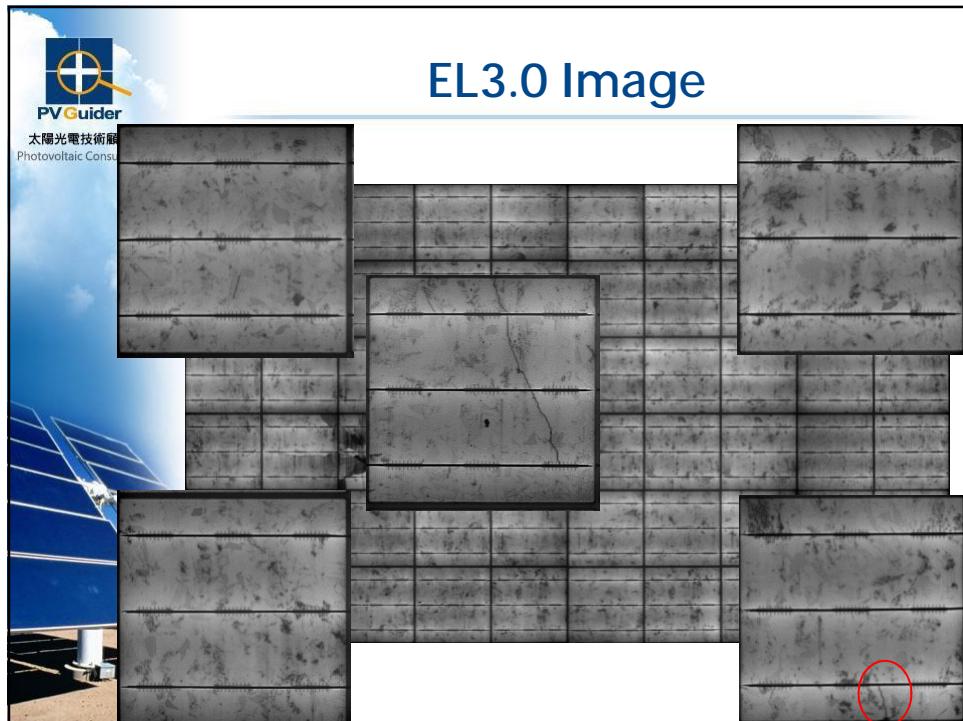


## Focal length difference





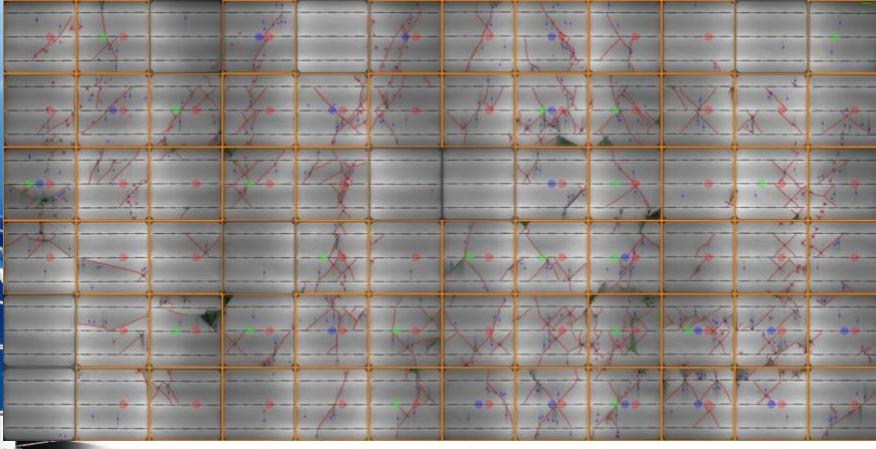




  
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## Automatic defect inspection

### AOI defect marking



  
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## EL1.0 to EL3.0

	Equipment	Usage	Resolution
EL1.0	Single camera with mirror	Off-line/ sampling	1X
EL2.0	Two camera with lifter	In-line/ manual	2X
EL3.0	Four cameras scanning	In-line/ AOI+2 modes	12X





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## Hi+Low Current Modes

109	106	86	107	96	100	108	121	93	104
100	106	92	92	97	96	100	111	96	100
117	116	98	101	102	109	120	112	95	99
96	102	51	78	89	93	107	104	73	99
90	109	99	113	109	112	99	112	91	107
103	93	96	88	93	104	97	99	100	101



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## Weak light performance

TSM-PC05B

- Excellent low light performance on cloudy days, mornings and evenings**  
优异的弱光发电表现（阴天、早晨、傍晚）
- Lighter Weight**  
更轻的重量
- Highly reliable due to stringent quality control**  
基于严格质量管控而具备的高可靠性
- Certified to withstand challenging environmental conditions**  
应对严酷环境的最佳解决方案

**New trend in SNEC**

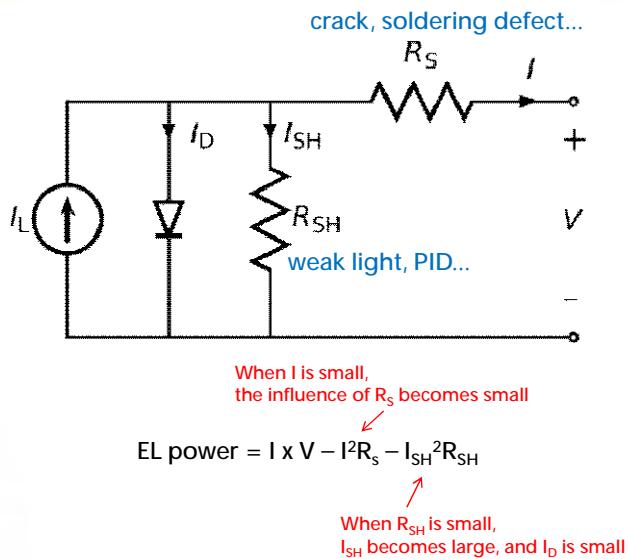
**领跑者效率•全领域适用**  
组件效率高达 16.7%  
功率温度系数 -0.41%/°C  
**200W/m<sup>2</sup> 低辐照度效率 97%**  
静态载荷(雪/风) 5400Pa/4000Pa



**EFFICIENCY LEADER**



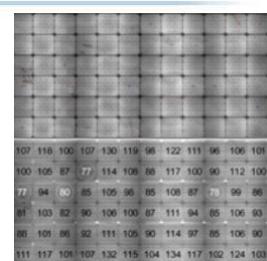
## Rs vs. Rsh



## EL-Z4 Plus



- ü 4 camera scanning EL
  - High resolution
  - No depth of field difference
- ü High + Low current EL modes
  - Weak light performance inspection
  - High throughput
- ü AOI defect marking
  - High accuracy
  - Save time for manual checking
  - Central control mode
- ü No lifting
  - No bending for thin glass
  - Extra-large module possible





## High speed EL can do more!

Ø Cell 100% EL inspection

Ø String EL inspection



## SCSS-EL02 Plus

**ASICCN**

- ü High speed- 1600 pcs/hr
- ü AOI automatic defect marking
- ü Synchronous Interconnected- 3200 pcs/hr/operator
- ü Hot spot inspection can be added



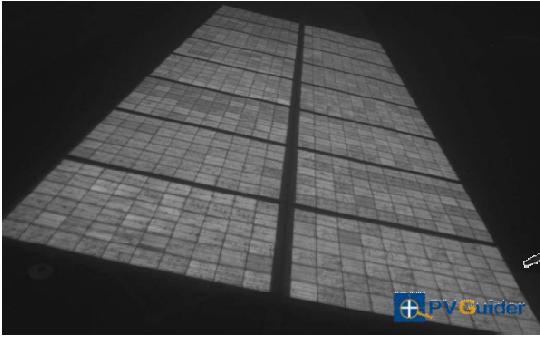
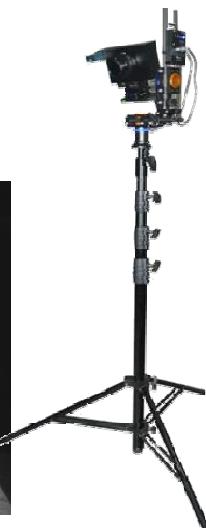
100% cell EL inspection is a new trend

  
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## Wi-Fi EL

**ASICCN**

- ü Portable and easy assembly
- ü Wireless control and image transmission
- ü Inspect modules on the rack
- ü Image of a module strings

  
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## Trend for on-site EL

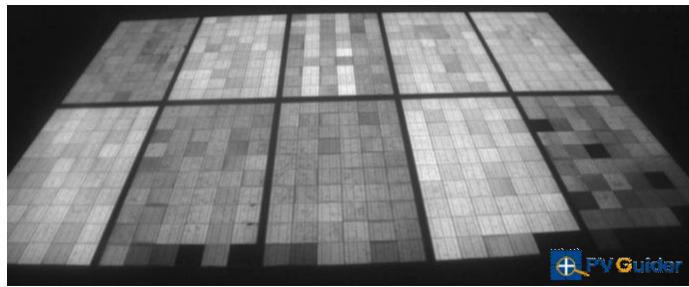


PI Berlin to introduce new PV error analysis method at Intersolar Europe  
 The Photovoltaik-Institut Berlin has developed a new automated process...  
PV-MAGAZINE.COM | 由 SUNRISEAM GMBH 上傳

- ü PI Berlin
- ü TUV Rheinland
- ü SunnysideupP
- ü Solar Zentrum
- ü...



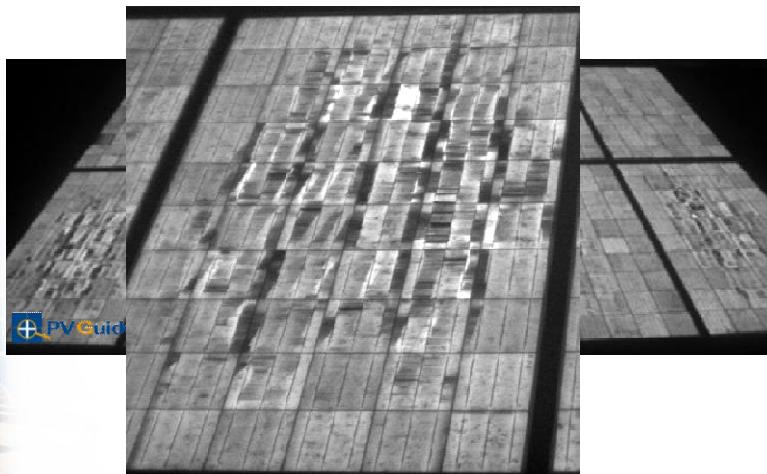
## High + Low current



Only feasible for high speed EL!



## Ü Installation, maintenance fault





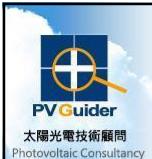
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## Comparison of inspection measures

Defect	Traditional methods ( stable irradiance required )			EL
	Electrical meters	IR Camera	IV Tracer	EL Camera
Low power	○	×	○	○
Bypass diode defect	△	○	△	★
PID	×	△	△	★
Hot spot	×	★	×	△
Weak light perform.	×	×	×	★
Module IQC	×	×	×	★
Improper installation	×	×	×	★
Accident inspection	×	×	×	★

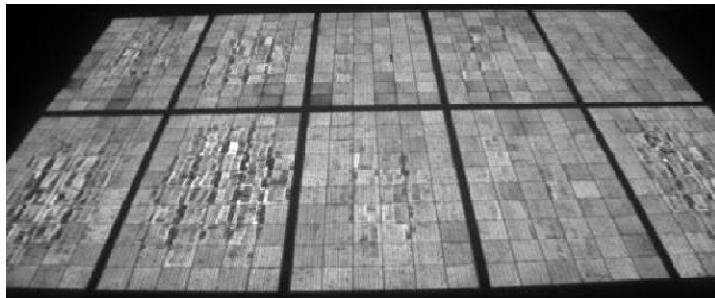
★ : Excellent · ○ : Feasible · △ : Difficult · × : Impossible





## Conclusions

- Ø EL3.0 starts revolution of PV industry
- Ø High/low current EL inspections are important
- Ø 100% cell EL inspection is ramping up
- Ø On-site EL is critical for plant quality



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## Catch up the trend!

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