Prolonged Lifetime Performance of Meyer Burger`s Hetero Junction Solar Modules

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MEYER BURGER

Introduction

- PV module guarantee of 30+ years is required
- Encapsulants function as adhesion of module components and provide protection from environmental impact
- EVA currently covers over 90 % of the market
- First long term outdoor experience uncovers excessive failure of EVAs
- Other encapsulants clearly show improved performance over EVA
- Especially TPOs provide extended module reliability demonstrated in DH and TC tests
- TPO allows for short lamination time < 8 min (GG, one chamber)

Material Performance

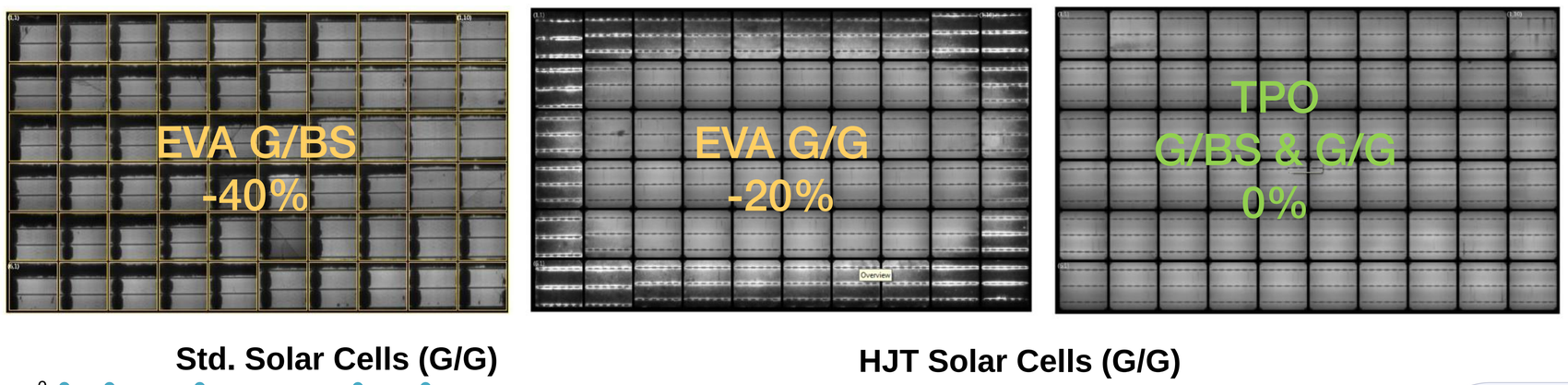
- Water Absorption Properties

Encapsulant	Water absorption (%)	WVTR (g/m²/day)	Probability of moisture ingress related degradation
EVA	0.2-0.3	10-30	+
PVB	0.4-0.5	25	+
TPO	<0.1	<5	-
Silicone	<0.1	>35	-
Ionomer	<0.1		-

- PID (potential induced degradation) stability of TPO
- No yellowing of TPO

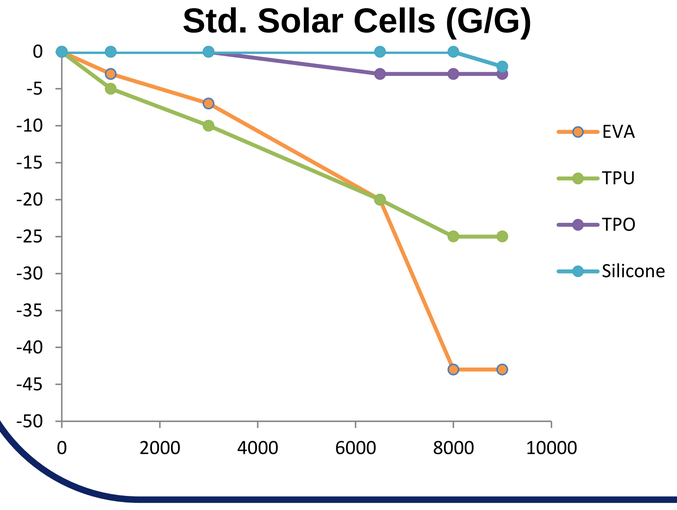
Reliability

EL after 7000 hours Damp Heat Test (85% RH, 85°C)

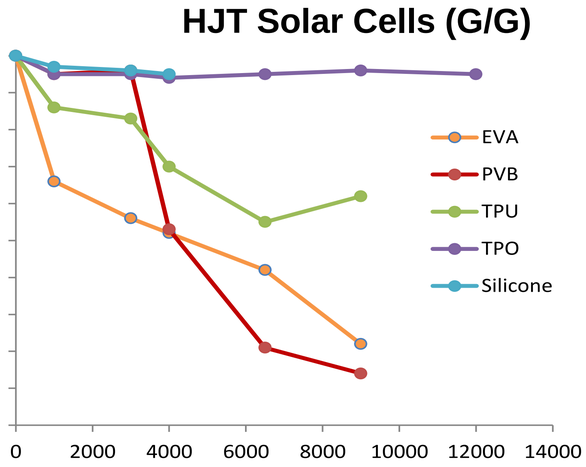


- Moisture ingress leads to cell degradation
- HJT solar cells are even more sensitive to moisture compared to std. cells
- TPO is intrinsically better regarding cell degradation

Std. Solar Cells (G/G)



HJT Solar Cells (G/G)



1200 Thermal Cycles (-40°C to +85°C)

	Initial	TC 600	TC 1200
Eff. [%]	19.5	19.3	19.3
J_{sc} [mA/cm²]	35.4	36.2	35.8
V_{oc} [mV/cell]	722	712	721
FF [%]	76.3	75.0	75.0
Degr. [%]	0	-0.9%	-0.8%

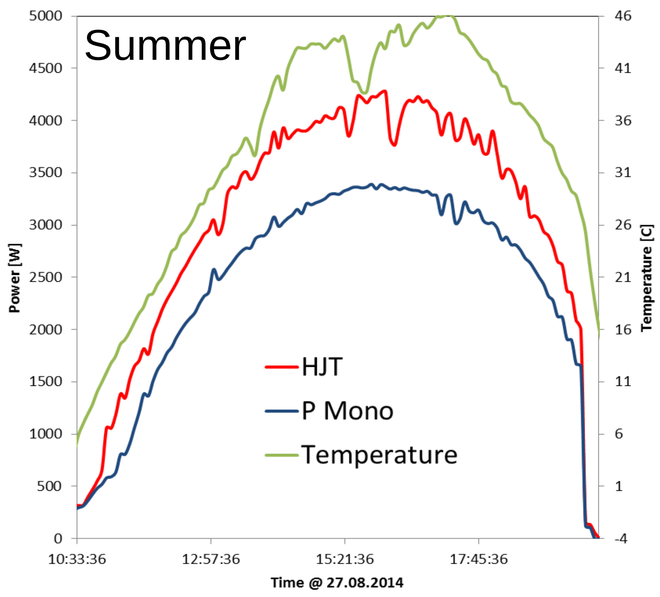
Outdoor: Monterosa @ 9460 ft

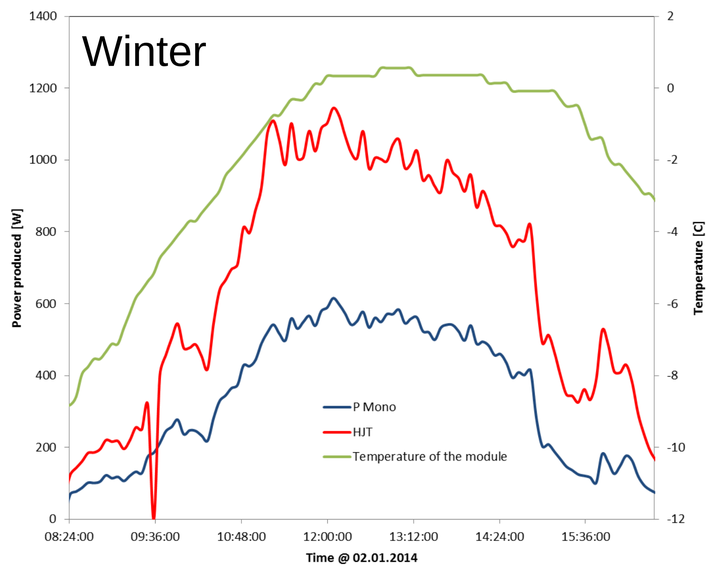
Test field: HJT-SWCT-GG @ 311 W => 4.665 kW
p c-Si mono-3BB-GG @ 252 W => 3.78 kW

TPO encapsulant; 5 mm glass at the front and at the back; mounted with pads at the back glass.

	2013*	2014**
HJT	4046W	4165W
p-mono	3254W	3253W

	Date	Time	Irradiation	Temp.
*	1 Sep`13,	3pm	915 W south, 1002W west	37°C
**	27Aug`14	3pm	891 W south, 1000W west	43°C





Yield HJT vs. P Mono: Summer + 25% Winter + 55%

Conclusion

TPO encapsulants show improved module reliability over EVA:

- High water vapor resistivity
- No degradation; No delamination
- No PID
- No yellowing

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