Mitigate Degradation through Advanced Manufacturing

Richard Qian *5 Nov 2020*

PERC mono c-Si and Degradation

- **Natural degradation due to aging**

- **Potential Induced Degradation (PID)**

- **Light Induced Degradation (LID)**:

Well known effect, impacting in the first several hours of the testing

Known mechanisms: Mainly due to Boron Oxygen complex formation (BO LID)

- **Light and elevated Temperature Induced Degradation (LeTID)**:

Occurs at elevated temperatures > 50°C under illumination

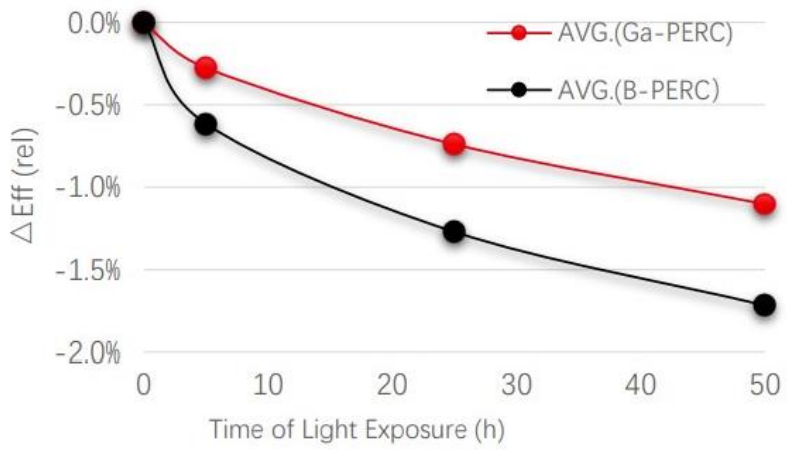
Slower degradation rate, followed by a much slower recovery

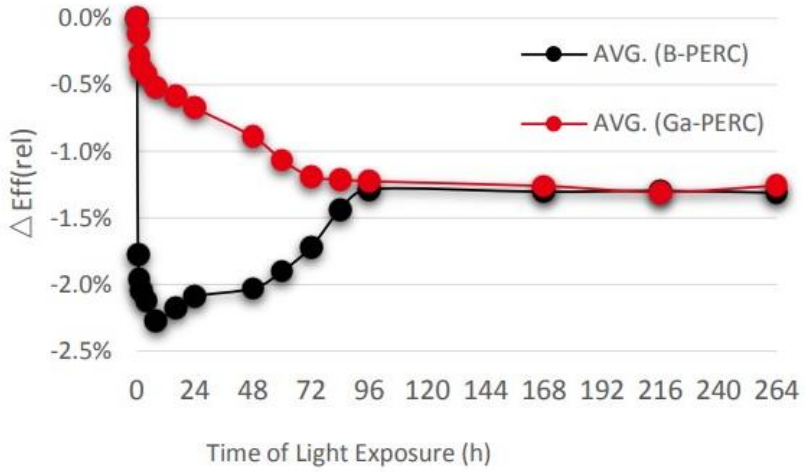
Unknown mechanisms: Possibly due to hydrogen diffusion in the bulk or hydrogen related defect activation

Solutions

Hydrogenation (2017)

Gallium doping (2020)





Source: LONGi Whitepaper

Ga doped P type mono wafer effectively eliminate LID and LeTID

Solutions

Propelling the transformation

BOM selection

- Select and verify material combination (BOM) through sophisticated process
- Internal and 3rd-party testing (standard, and accelerated long sequential)
- 3rd party LID and LeTID test

2020 TOP PERFORMER
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PV MODULE RELIABILITY SCORECARD

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LONGi Solar
RETC

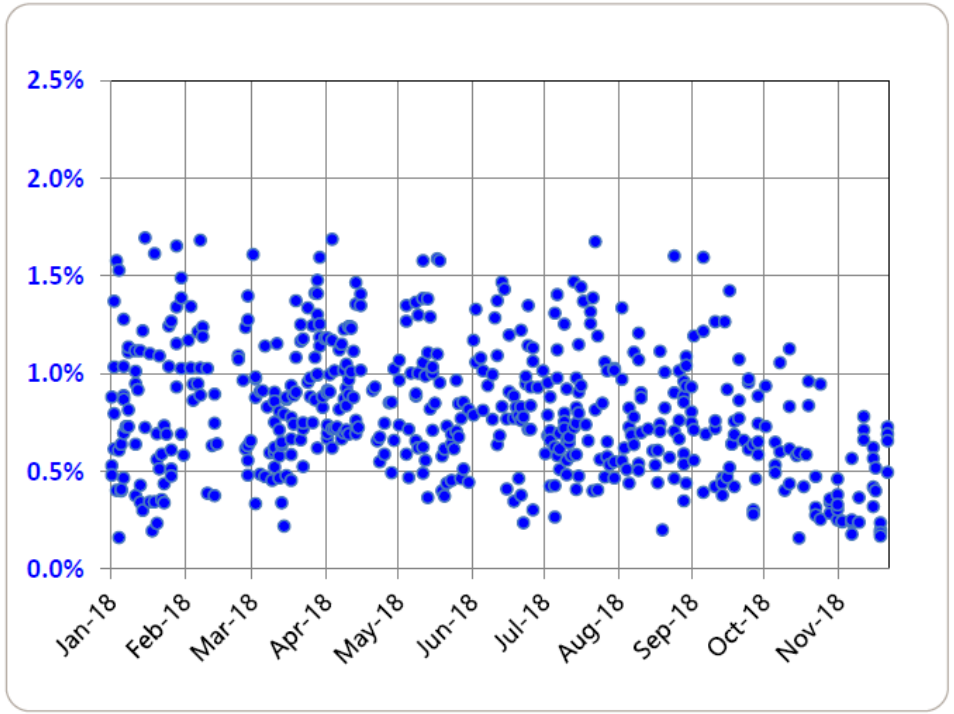
TÜVRheinland®
CERTIFIED
2 PfG 2689/04.19

Solutions

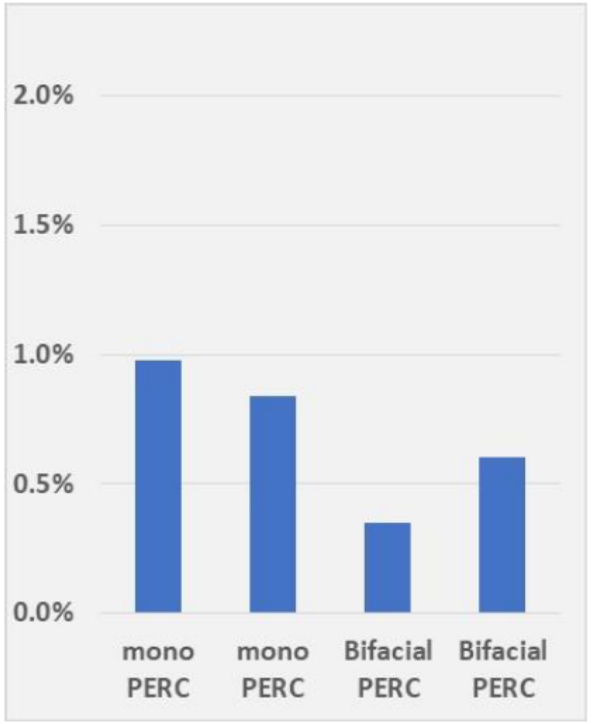
Optimize manufacturing process

Sample, test and monitor regularly

Daily mono PERC cell LID/LeTID monitoring (at 80C)



Module LeTID Measurement

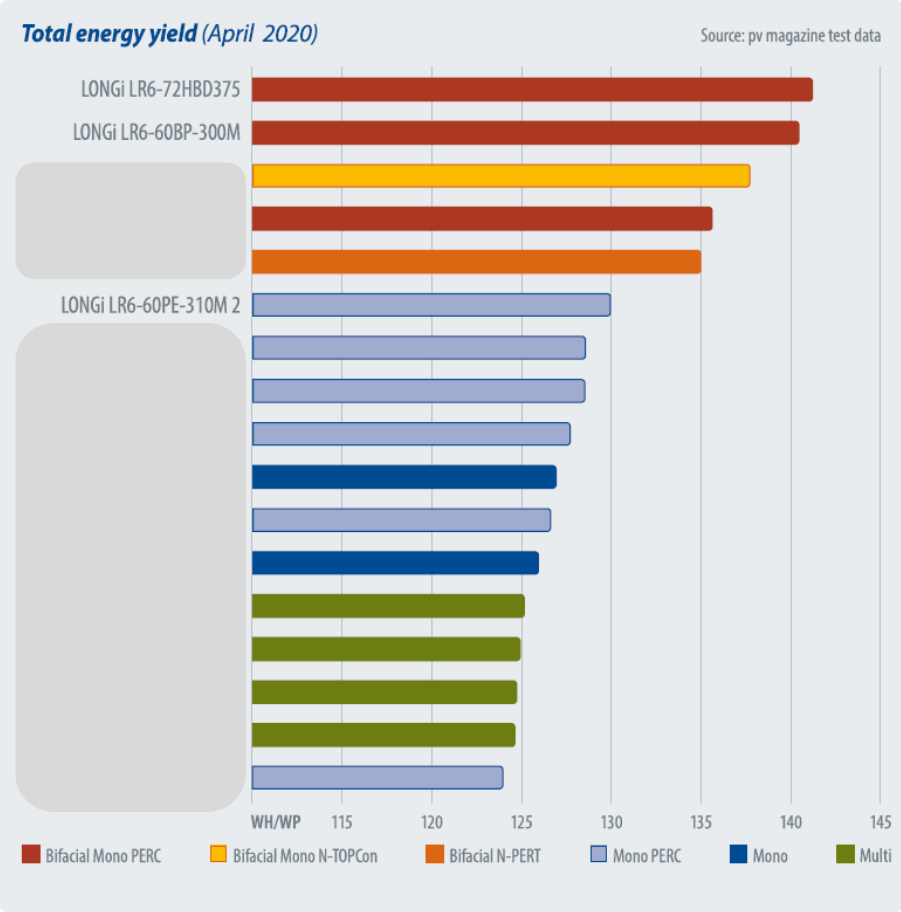


LONGi internal LeTID test at 75C

Solutions

Outdoor performance tracking and monitoring

pv magazine test



Systems being monitored around the globe

LONGi

Propelling the transformation

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