

New developments in accelerated weathering tests for back-contact modules



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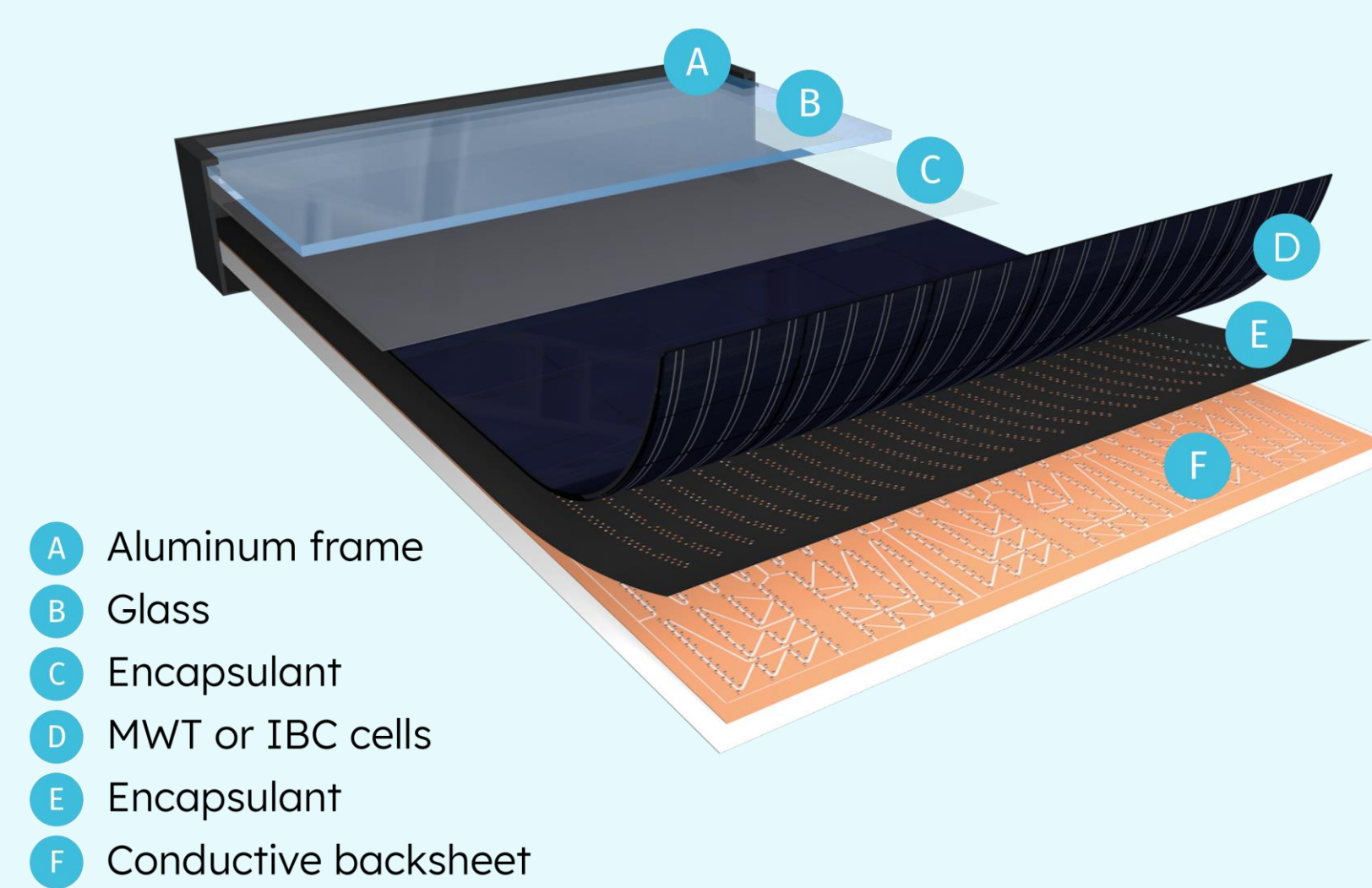
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Introduction and objective of study

Endurans™ Solar (formerly DSM Advanced Solar, recently acquired by Worthen Industries Inc.), a leading supplier of science-based material solutions for solar, commercializes Endurans™ CB, a conductive backsheet for high-efficiency, aesthetically pleasing back-contact solar modules, based on metal wrap-through (MWT) or interdigitated back-contact (IBC) technology.

During the EU PVSEC in 2019, benefits of our Endurans™ CB were demonstrated, leading to high-yield module manufacturing.



Back-contacted module layout

Furthermore, during last year's PVSEC (2020), it was shown that our unique interconnection technology leads to 8% higher power output compared with standard tabbing and stringing.

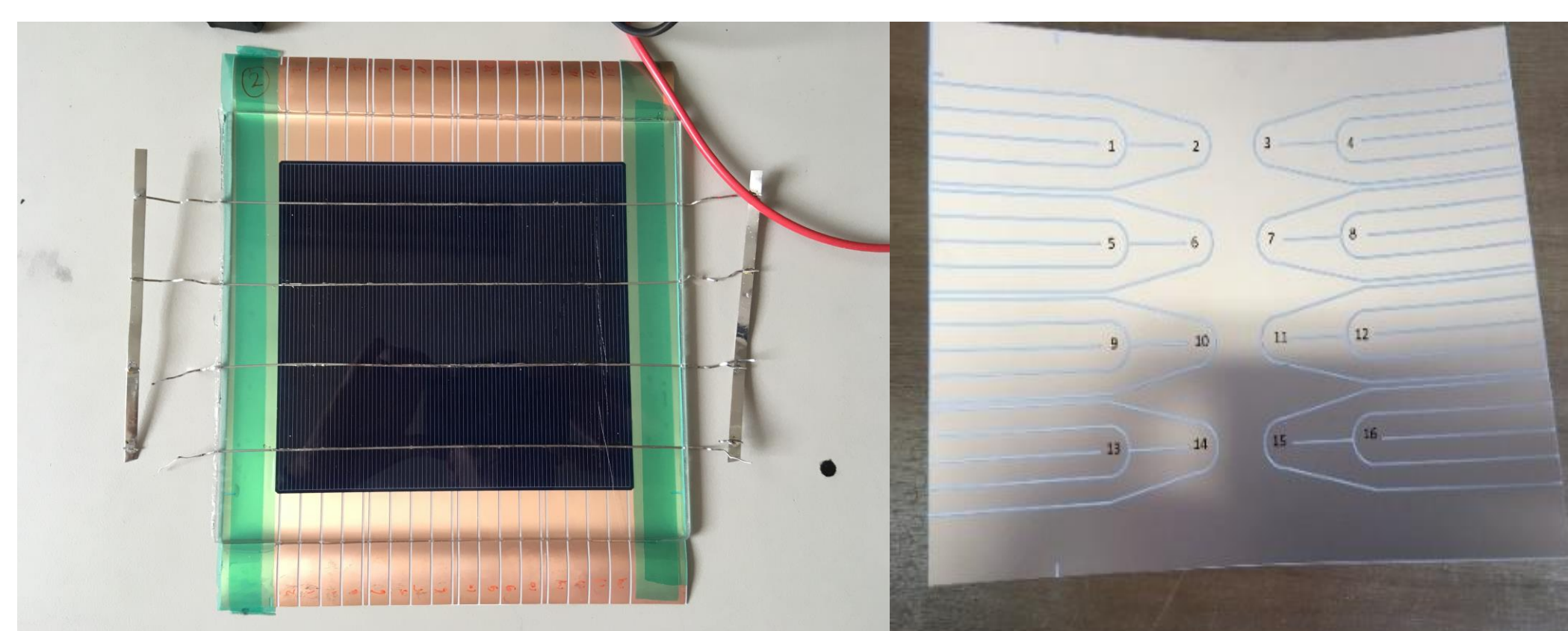
This poster shows new accelerated ageing techniques that deliver faster ageing behavior results than the current Thermal Cycling and Damp Heat procedures. This enables faster introduction of better and/or more reliable, cost-effective materials.

Current Thermal Cycling and Damp Heat tests are time-intensive

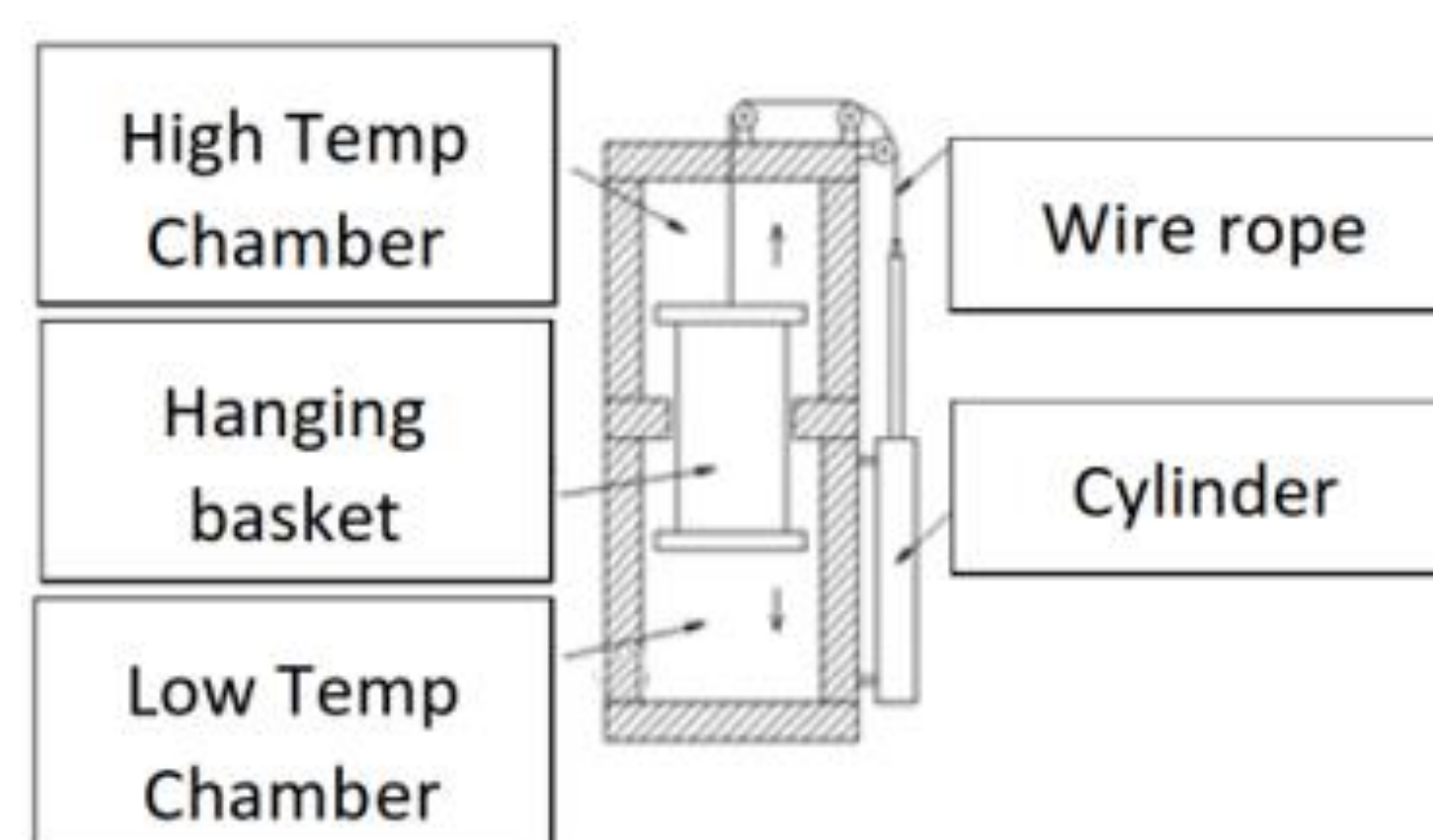
Important ageing tests that modules need to pass are Thermal Cycling and Damp Heat (IEC 61215). In Thermal Cycling, a module is put in a climate chamber, which induces multiple thermal cycles between -40 and 85°C. The minimum requirement for a solar panel to pass is 200 cycles, but customers usually require 600 cycles, which typically takes 4-5 months.

In Damp Heat tests, a module is put in a climate chamber, which is set at 85°C and 85% relative humidity. The minimum requirement to pass is 1,000 hours of ageing, but customers usually require a minimum ageing time of 3,000 hours.

Three new promising fast-ageing techniques



Single-point resistance measurement / Cell vias on conductive backsheets

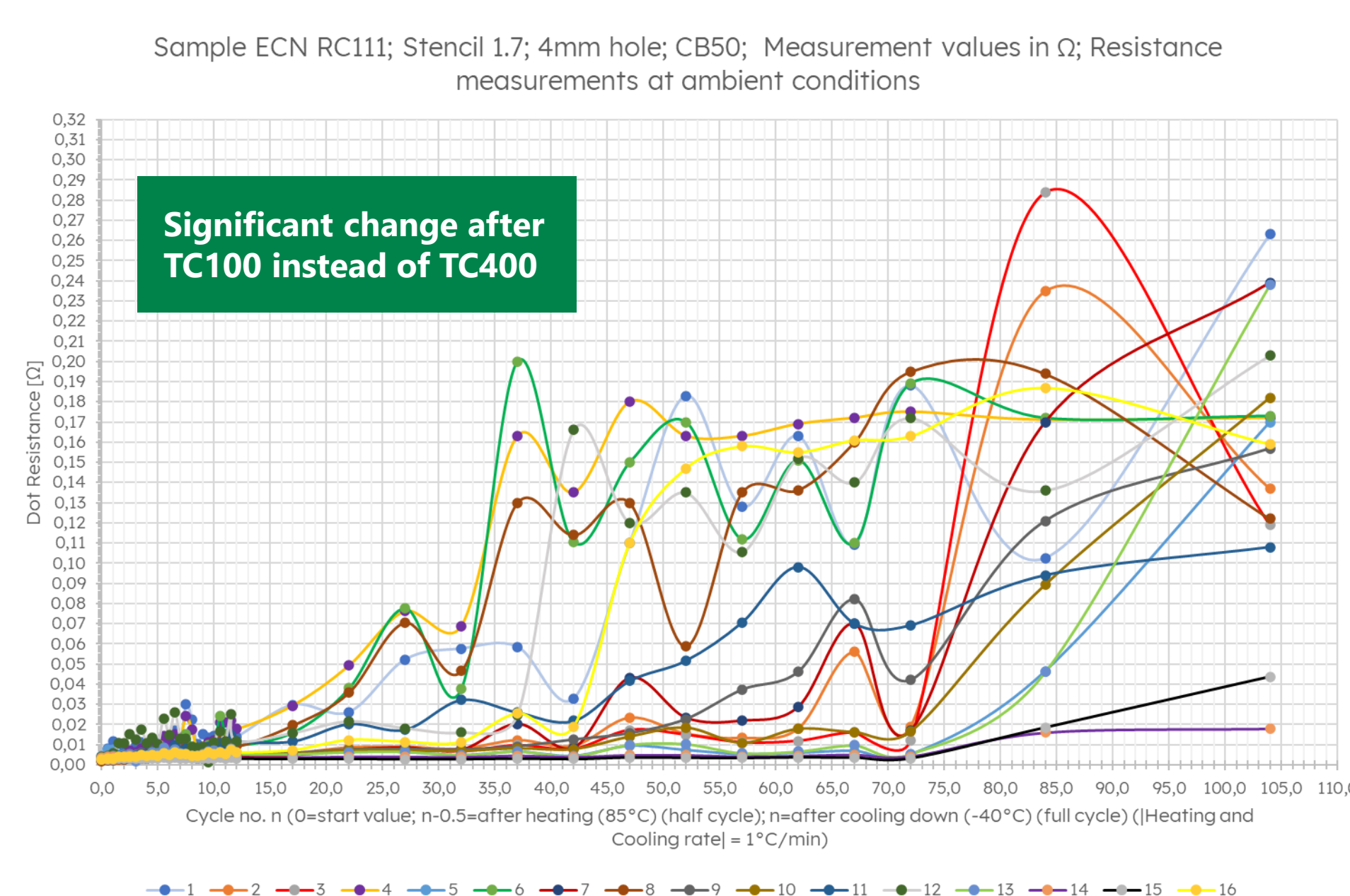


Thermal Shock chamber: Schematic drawing 85°C to -40°C

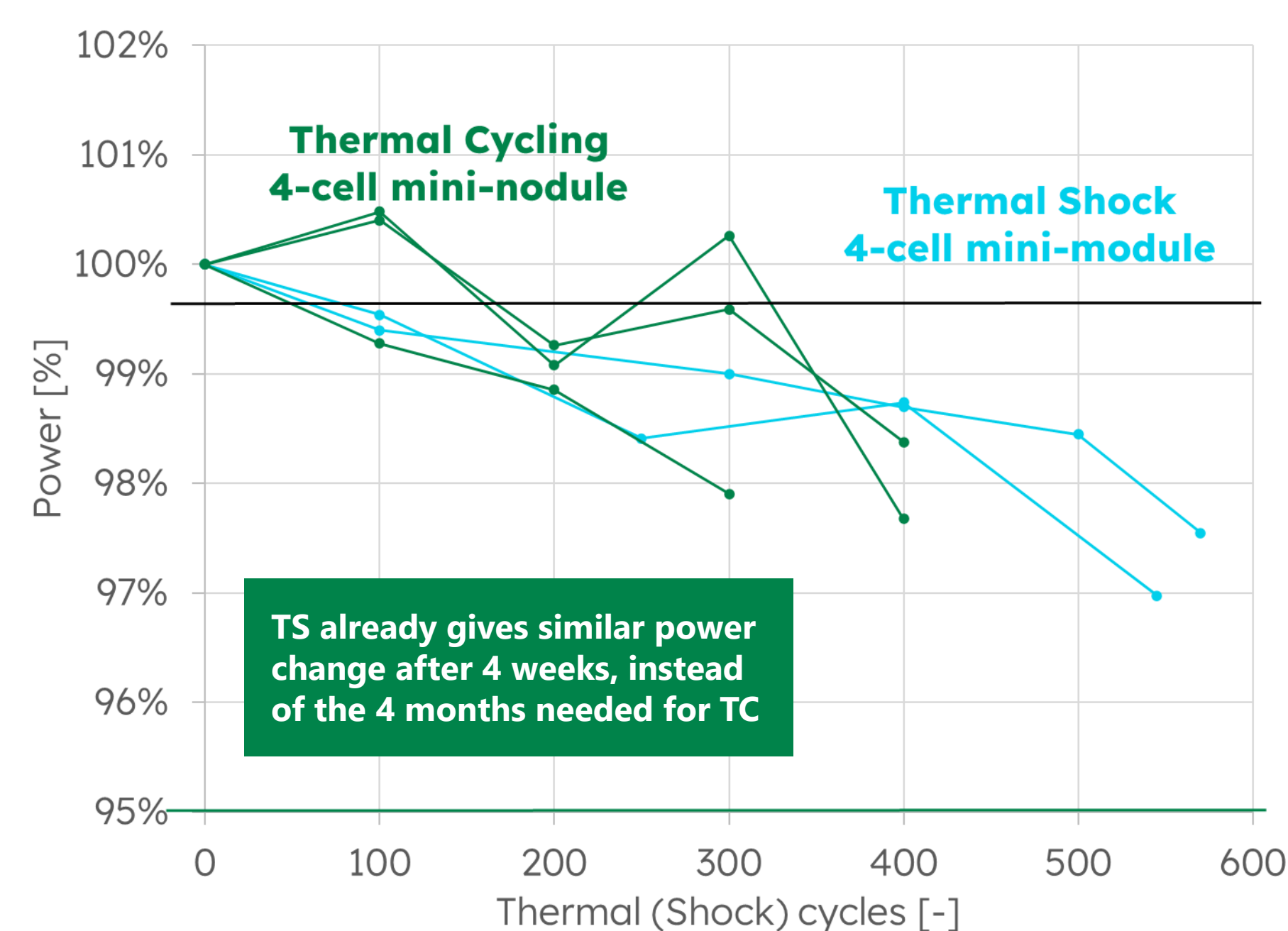


Damp heat at higher temperature 95°C instead of 85°C

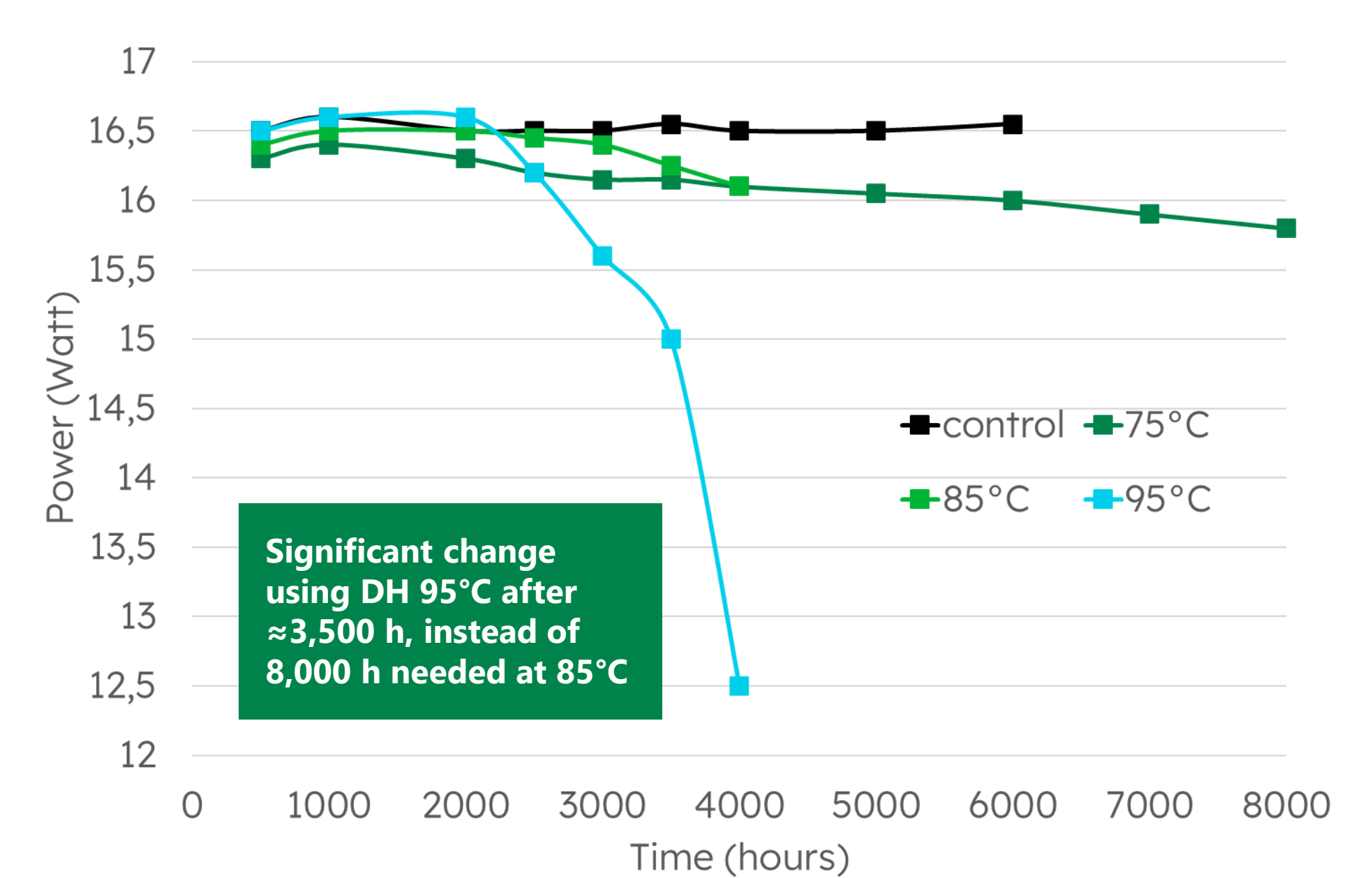
Experimental results



Contact resistance measurement on different conductive adhesive dots during thermal cycling



Power decay upon thermal cycling versus thermal shock test



Modules with high fill factor using DSM conductive backsheet

Conclusions

The results of the study show that the new ageing techniques deliver much faster ageing behavior results than the Thermal Cycling and Damp Heat techniques. Using single-point resistance measurements or Thermal Shock rather than standard Thermal Cycling tests delivers similar results in one month, rather than the four months necessary to complete 400 Thermal Cycles. Furthermore, increasing the temperature in the Damp Heat test by 10°C generates similar results while decreasing the time taken by a factor of two.

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