

Solar Cells Reporting Summary

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► Experimental design

Please check: are the following details reported in the manuscript?

1. Dimensions

- Area of the tested solar cells ☒ Yes ☐ No Cell diameter is provided on page 4 and methods section on page 18
- Method used to determine the device area ☐ Yes ☒ No Area of the circular device was calculated from the diameter

2. Current-voltage characterization

- Current density-voltage (J-V) plots in both forward and backward direction ☐ Yes ☒ No The current-voltage (I-V) plots in the forward direction are provided in Figs. 2b and 3a, while the data in backward direction is not presented as it is not relevant to power generation
- Voltage scan conditions ☐ Yes ☒ No A typical I-V scan was performed using a linear staircase sweep capability of Keithley 2401 Sourcemeter. The voltage is varied in the forward direction from 0 to 0.3 V in steps of 0.02 V with a dwell time of 1 ms.
For instance: scan direction, speed, dwell times
- Test environment ☒ Yes ☐ No Test characterization information can be found on pages 4 and 5 of the manuscript
For instance: characterization temperature, in air or in glove box
- Protocol for preconditioning of the device before its characterization ☐ Yes ☒ No All devices underwent solvent cleaning (10 minutes in acetone, followed by 5 minutes in isopropyl alcohol) before mounting them in the test setup.
- Stability of the J-V characteristic ☐ Yes ☒ No Since our study is a proof of principle, we did not perform stability studies on our TPV system.
Verified with time evolution of the maximum power point or with the photocurrent at maximum power point; see ref. 7 for details.

3. Hysteresis or any other unusual behaviour

- Description of the unusual behaviour observed during the characterization ☐ Yes ☒ No No hysteresis was observed
- Related experimental data ☐ Yes ☒ No No hysteresis was observed

4. Efficiency

- External quantum efficiency (EQE) or incident photons to current efficiency (IPCE) ☐ Yes ☒ No We did not use EQE to calculate the power conversion efficiency. The details of our efficiency estimates can be found on page 8 of the manuscript
- A comparison between the integrated response under the standard reference spectrum and the response measure under the simulator ☐ Yes ☒ No The cells were not measured under the standard reference spectrum
- For tandem solar cells, the bias illumination and bias voltage used for each subcell ☐ Yes ☒ No We did not use tandem cells

5. Calibration

- Light source and reference cell or sensor used for the characterization ☒ Yes ☐ No The details of our custom-built light source (emitter) can be found on pages 4 and 18.

Confirmation that the reference cell was calibrated and certified	☐ Yes ☒ No	The characterization of the source temperature can be found in the methods section and supplementary note 6
Calculation of spectral mismatch between the reference cell and the devices under test	☐ Yes ☒ No	No reference cell was used in this study.
6. Mask/aperture		
Size of the mask/aperture used during testing	☐ Yes ☒ No	No mask/aperture was used for testing
Variation of the measured short-circuit current density with the mask/aperture area	☐ Yes ☒ No	No mask/aperture was used for testing
7. Performance certification		
Identity of the independent certification laboratory that confirmed the photovoltaic performance	☐ Yes ☒ No	The TPV cell was not sent out for certification
A copy of any certificate(s) <i>Provide in Supplementary Information</i>	☐ Yes ☒ No	The TPV cell was not sent out for certification
8. Statistics		
Number of solar cells tested	☐ Yes ☒ No	NFTPV measurements from one cell have been presented in the manuscript, and the electrical power output of 2 additional cells has been tested at a range of source (emitter) temperatures.
Statistical analysis of the device performance	☐ Yes ☒ No	No statistical analysis is reported in this study.
9. Long-term stability analysis		
Type of analysis, bias conditions and environmental conditions <i>For instance: illumination type, temperature, atmosphere humidity, encapsulation method, preconditioning temperature</i>	☐ Yes ☒ No	Long-term studies were not performed, but InGaAs cells are known to have long lifetimes