

Solar Cells Reporting Summary

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ü Experimental design

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

1. Dimensions

- Area of the tested solar cells Yes Described in "Methods" section. The area of 4.1 mm².
 No
- Method used to determine the device area Yes Described in "Methods" section. Aperture of 4.095 mm² used to determine the area. The area is confirmed by the National Institute of Metrology (NIM, Beijing).
 No

2. Current-voltage characterization

- Current density-voltage (J-V) plots in both forward and backward direction Yes Reported in Supplementary Figure 6.
 No
- Voltage scan conditions Yes Described in "Methods" section. Cells are measured in both forward and backward directions with a step voltage of 0.04 V. The dwell time is 0.2 s for every point.
For instance: scan direction, speed, dwell times
 No
- Test environment Yes Described in "Methods" section. The J-V characteristics were conducted in glove box at the temperature of 25 °C.
For instance: characterization temperature, in air or in glove box
 No
- Protocol for preconditioning of the device before its characterization Yes No preconditioning of the device before its characterization.
 No
- Stability of the J-V characteristic Yes Photocurrent tracked at maximum power point for about 400 min is provided in Supplementary Figure 3.
Verified with time evolution of the maximum power point or with the photocurrent at maximum power point; see [ref. 7](#) for details.
 No

3. Hysteresis or any other unusual behaviour

- Description of the unusual behaviour observed during the characterization Yes Supplementary Figure 6 shows there is no hysteresis during the characterization.
 No
- Related experimental data Yes Data shown in Supplementary Figure 6 in the supplementary file.
 No

4. Efficiency

- External quantum efficiency (EQE) or incident photons to current efficiency (IPCE) Yes EQE spectra of cells are shown in Supplementary Figure 2.
 No
- A comparison between the integrated response under the standard reference spectrum and the response measure under the simulator Yes Integrated EQE under AM1.5 is comparable to current density under solar simulator.
 No
- For tandem solar cells, the bias illumination and bias voltage used for each subcell Yes No tandem cells are reported in the work.
 No

5. Calibration

- Light source and reference cell or sensor used for the characterization Yes Described in "Methods" section. The light source is a solar simulator (Newport, Sol3A).
 No
- Confirmation that the reference cell was calibrated and certified Yes Described in "Methods" section. The reference silicon cell was certified by NIST (Newport 532 ISO1599).
 No

- Calculation of spectral mismatch between the reference cell and the devices under test
 Yes Mismatch is not calculated.
 No
6. Mask/aperture
- Size of the mask/aperture used during testing
 Yes Described in "Methods" section. Aperture area of 4.095 mm² was used.
 No
- Variation of the measured short-circuit current density with the mask/aperture area
 Yes Described in "Methods" section. There is no variation.
 No
7. Performance certification
- Identity of the independent certification laboratory that confirmed the photovoltaic performance
 Yes This work focuses on a mechanically robust new interlayer.
 No
- A copy of any certificate(s)
Provide in Supplementary Information
 Yes N/A
 No
8. Statistics
- Number of solar cells tested
 Yes 12 to 28 cells for different types of cells were tested.
 No
- Statistical analysis of the device performance
 Yes Statistical analysis are provided in Supplementary Figure 4.
 No
9. Long-term stability analysis
- Type of analysis, bias conditions and environmental conditions
For instance: illumination type, temperature, atmosphere humidity, encapsulation method, preconditioning temperature
 Yes A cell is tested under one-sun solar simulation illumination for 200 h (Supplementary Figure 5).
 No