

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 'J-V characterization' sub-section under 'Methods' section.
- Method used to determine the device area ☒ Yes ☐ No 'J-V characterization' sub-section under 'Methods' section.

2. Current-voltage characterization

- Current density-voltage (J-V) plots in both forward and backward direction ☒ Yes ☐ No 'J-V characterization' sub-section under 'Methods' section.
- Voltage scan conditions ☒ Yes ☐ No 'J-V characterization' sub-section under 'Methods' section.
For instance: scan direction, speed, dwell times
- Test environment ☒ Yes ☐ No 'J-V characterization' sub-section under 'Methods' section.
For instance: characterization temperature, in air or in glove box
- Protocol for preconditioning of the device before its characterization ☐ Yes ☒ No Preconditioning not needed for these devices
- Stability of the J-V characteristic ☐ Yes ☒ No Stability and high efficiency are not the main focus of this paper
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 Devices didn't exhibit any unusual behavior during characterization
- Related experimental data ☐ Yes ☒ No Devices didn't exhibit any unusual behavior during characterization

4. Efficiency

- External quantum efficiency (EQE) or incident photons to current efficiency (IPCE) ☒ Yes ☐ No Supplementary Figure 11, Supplementary Table 1
- A comparison between the integrated response under the standard reference spectrum and the response measure under the simulator ☐ Yes ☒ No Record devices with high J_{sc} (current) values are not a focus of this paper
- For tandem solar cells, the bias illumination and bias voltage used for each subcell ☐ Yes ☒ No This paper does not report any tandem solar cells

5. Calibration

- Light source and reference cell or sensor used for the characterization ☒ Yes ☐ No 'J-V characterization' sub-section under 'Methods' section.
- Confirmation that the reference cell was calibrated and certified ☒ Yes ☐ No 'J-V characterization' sub-section under 'Methods' section.

Calculation of spectral mismatch between the reference cell and the devices under test

☒ Yes
☐ No

'J-V characterization' sub-section under 'Methods' section.

6. Mask/aperture

Size of the mask/aperture used during testing

☒ Yes
☐ No

'J-V characterization' sub-section under 'Methods' section.

Variation of the measured short-circuit current density with the mask/aperture area

☐ Yes
☒ No

Device performance as a function of mask area is not the focus of this paper

7. Performance certification

Identity of the independent certification laboratory that confirmed the photovoltaic performance

☐ Yes
☒ No

This paper does not report record solar cell efficiencies

A copy of any certificate(s)

Provide in Supplementary Information

☐ Yes
☒ No

This paper does not report record solar cell efficiencies

8. Statistics

Number of solar cells tested

☒ Yes
☐ No

Captions of Figures 1, 2, 4, Table 1, Supplementary Figures 1, 7, 9

Statistical analysis of the device performance

☒ Yes
☐ No

Table 1

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
☒ No

Stability and high efficiency are not the main focus of this paper