

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	0.64–0.67 cm ² , as detailed in the Methods – Sample fabrication section
	☐ No	
Method used to determine the device area	☒ Yes	Devices blast-delineated through a mask as detailed in the Methods – Sample fabrication section
	☐ No	

2. Current-voltage characterization

Current density-voltage (J-V) plots in both forward and backward direction	☐ Yes	Hysteresis not observed
	☒ No	
Voltage scan conditions <i>For instance: scan direction, speed, dwell times</i>	☒ Yes	J-V curve independent of voltage scan conditions. Scan from negative (-0.8V) to positive bias (+1.2 V) in 0.025 V steps with a 4 ms dwell at each bias, as detailed in the Methods – Characterization section
	☐ No	
Test environment <i>For instance: characterization temperature, in air or in glove box</i>	☒ Yes	Cells characterized in ambient atmosphere at room temperature, as detailed in the Methods – Characterization section
	☐ No	
Protocol for preconditioning of the device before its characterization	☐ Yes	No need to pre-condition devices before measurements.
	☒ No	
Stability of the J-V characteristic <i>Verified with time evolution of the maximum power point or with the photocurrent at maximum power point; see ref. 7 for details.</i>	☐ Yes	No short-term degradation in J-V characteristic observed with CdSeTe solar cells.
	☒ No	Long-term degradation not the subject of this study.

3. Hysteresis or any other unusual behaviour

Description of the unusual behaviour observed during the characterization	☐ Yes	Hysteresis not observed
	☒ No	
Related experimental data	☐ Yes	Hysteresis not observed
	☒ No	

4. Efficiency

External quantum efficiency (EQE) or incident photons to current efficiency (IPCE)	☒ Yes	Detailed in the Methods – Characterization section
	☐ No	
A comparison between the integrated response under the standard reference spectrum and the response measure under the simulator	☐ Yes	Current density losses not the subject of this contribution.
	☒ No	
For tandem solar cells, the bias illumination and bias voltage used for each subcell	☐ Yes	Not tandem cells.
	☒ No	

5. Calibration

Light source and reference cell or sensor used for the characterization	☒ Yes	Detailed in the Methods – Characterization section
	☐ No	J-V measurements performed under 1-sun illumination from an ABET Technologies 10600 Xenon Arc lamp equipped with an AM1.5G filter, calibrated using a stable CdS/CdTe cell of known Jsc.

Confirmation that the reference cell was calibrated and certified	☐ Yes ☒ No	Reference cell not certified but current density is not the subject of our manuscript. Jsc of the calibration cell has been measured at NREL periodically to verify stability.
Calculation of spectral mismatch between the reference cell and the devices under test	☐ Yes ☒ No	Spectral mismatch not calculated. Again, current density is not the subject of this contribution.
6. Mask/aperture		
Size of the mask/aperture used during testing	☐ Yes ☒ No	No mask used. Current density is not the subject of this contribution.
Variation of the measured short-circuit current density with the mask/aperture area	☐ Yes ☒ No	No mask used. Current density is not the subject of this contribution.
7. Performance certification		
Identity of the independent certification laboratory that confirmed the photovoltaic performance	☐ Yes ☒ No	No record efficiency reported here, paper focuses on voltage loss analysis.
A copy of any certificate(s) <i>Provide in Supplementary Information</i>	☐ Yes ☒ No	No record efficiency reported here, paper focuses on voltage loss analysis.
8. Statistics		
Number of solar cells tested	☒ Yes ☐ No	Caption of Figures 5 and 6. Sample comprises 8 to 25 cells, Voc measured on at least 7 devices, ERE measured on a representative portion of the devices (3 to 22 depending on sample size).
Statistical analysis of the device performance	☒ Yes ☐ No	Figure 4c, 4d, 5, and 6.
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 degradation not the subject of this study.