Rayleigh SOLAR TECH

Founded 2016

Upscaling perovskite technology using sheet-to-sheet and roll-to-roll slot die coating techniques

PACT Workshop 2022
CFV Labs

rayleighsolartech.com

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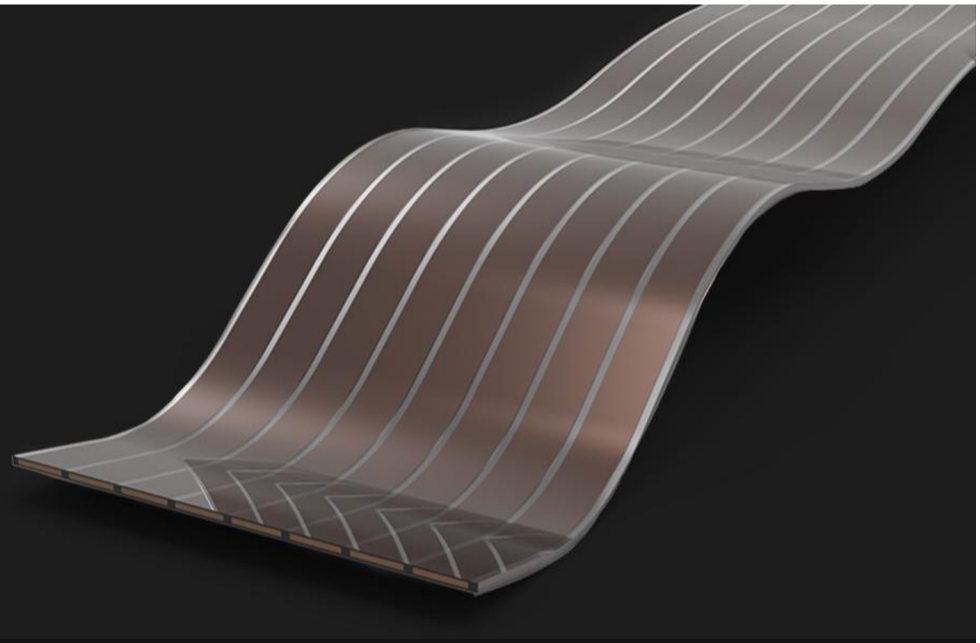
Halifax NS
Founded 2016

20 Staff **– 14** Different languages
>50% Female

World class research and engineering capabilities

12 Scientists & engineers
100 Peer-reviewed papers
8 Masters & **6** PhDs
Attracting top global talent

Perovskite solar is the answer.



Flexible and Lightweight

Our solar panels can be applied on almost any shape or surface, expanding the range of application possibilities.

Highly Tunable

Can be optimized for multiple end-use applications (both indoor and outdoor).

Low-Cost Manufacturing

Less input material, low temperature manufacturing, widely abundant materials.

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A platform for multiple markets

Mobility:

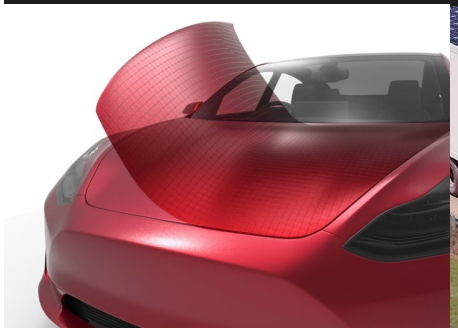
- Electric vehicles
- E-buses
- Last mile delivery vehicles
- Transport trucks

Internet of things:

- Built-in device charging
- Sensors
- Digital price tags
- Electronic door locks

Other:

- Building integrated
- Greenhouses
- Satellites
- Utility power





Market opportunity

Select thin film solar markets:

Electric vehicles	Internet of things	BIPV
$6.9 B annually	**$1.0 B annually**	**$11.3 B annually**
21% CAGR	22% CAGR	24% CAGR

Target market:
Mobility

Collaboration on-going with
Magna International Inc. (Tier 1 auto supplier)

Case study
SUV solar panel coverage in LA

Annual miles powered by solar:
25%

Reduction in plug-in charging:
27%

Annual CO_2 offset:
452 kg

Customer value:
- Go further on one charge
- Less plug-in charging
  - Save time & money
- Reduce battery size & cost
- Power on-board electronics

Market size (EVs):
- 21% CAGR
- $7B solar market

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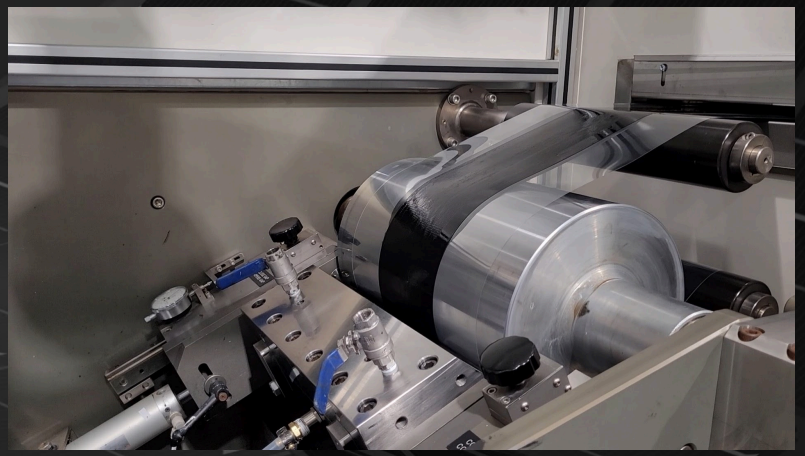
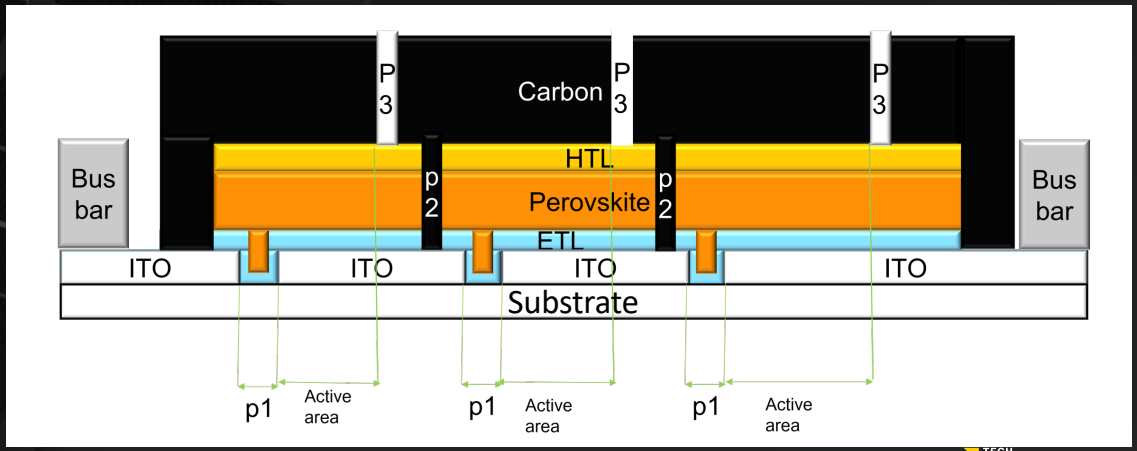
Our manufacturing process

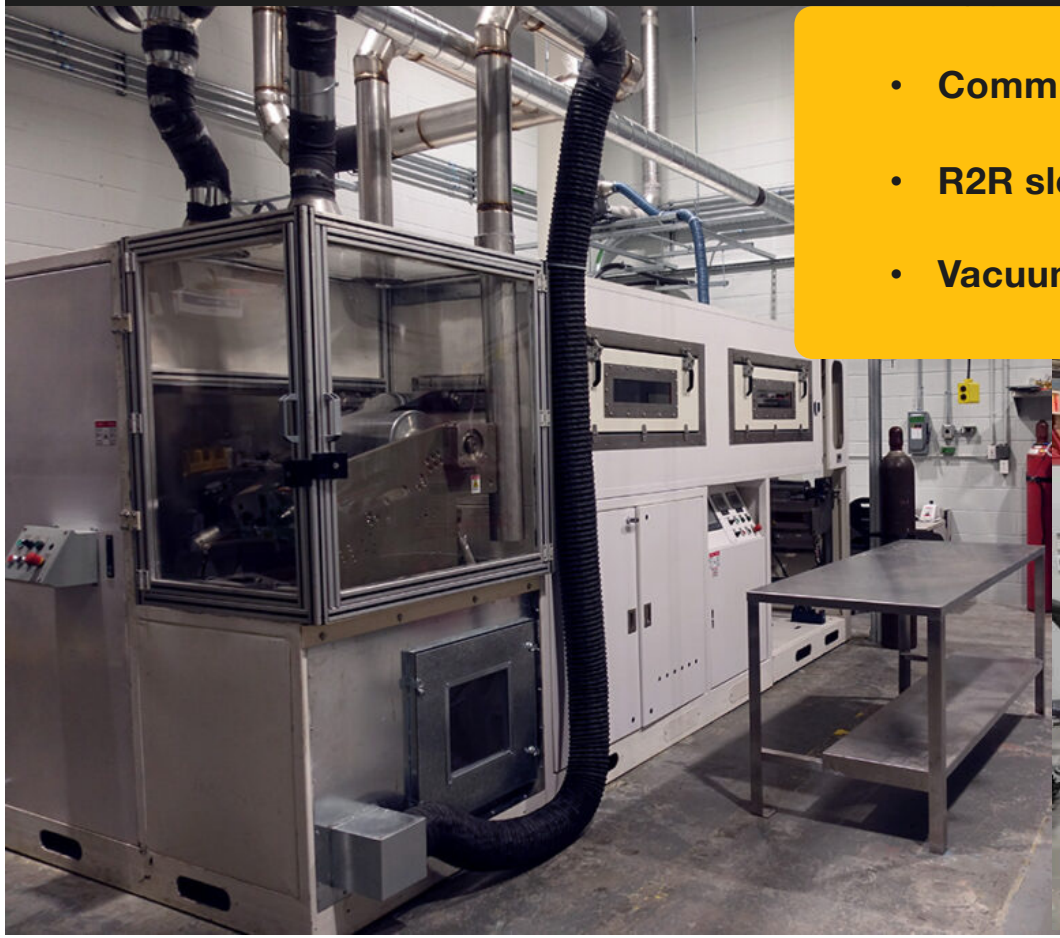
- Focused on n-i-p carbon electrode PSCs
- Low temp processing, low cost, solution processed, good mechanical flexibility, high thermal stability

- Roll-to-roll high throughput manufacturing
- Focus on slot-die coating
- Highly scalable, low material loss, no realistic viscosity limits

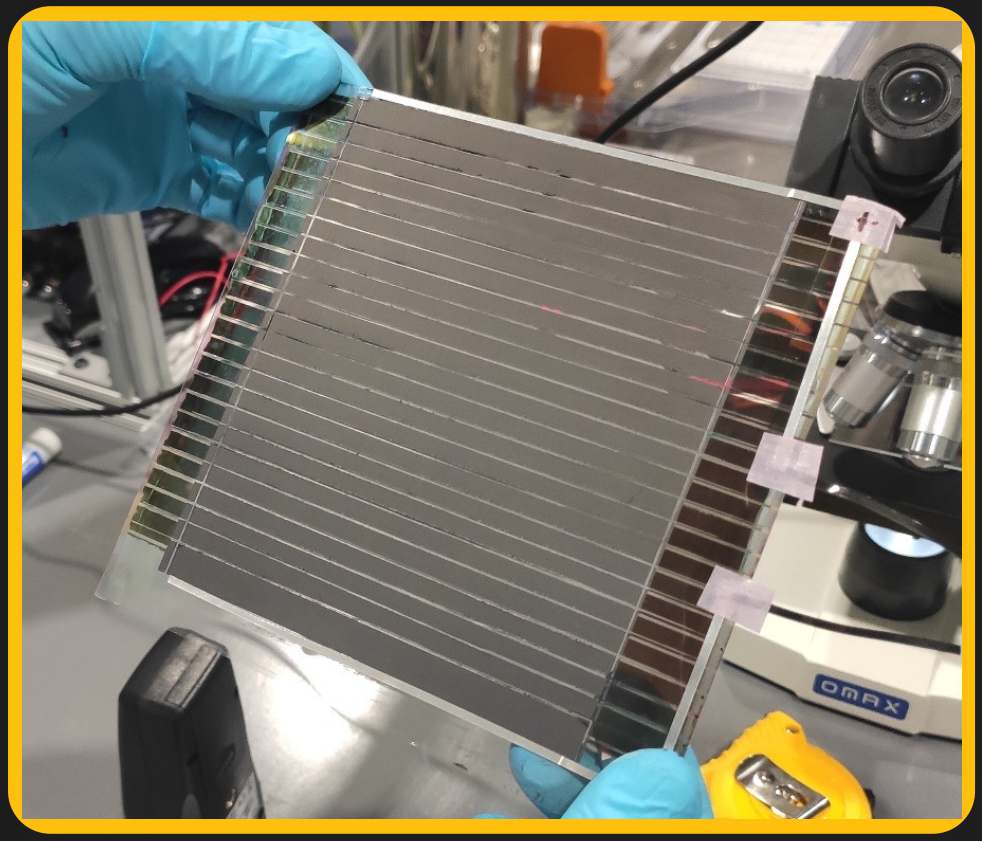




Pilot scale manufacturing



- **Commissioned pilot coating line end of 2021**
- **R2R slot die coater, 30 cm maximum coating width**
- **Vacuum laminator (1.2 m x 1 m)**



Sheet coated modules

Fully slot-die coated, ambient processed

- 15 x 15 cm substrate,
- 16 cell module
- 10.04% PCE

Achieved summer 2022
Roadmap to 12% by end of the year

In parallel - transfer of this efficiency to R2R currently limited by R2R laser scribing capabilities

Solar film integrated automotive panel project

On-going collaboration with Magna International Inc.

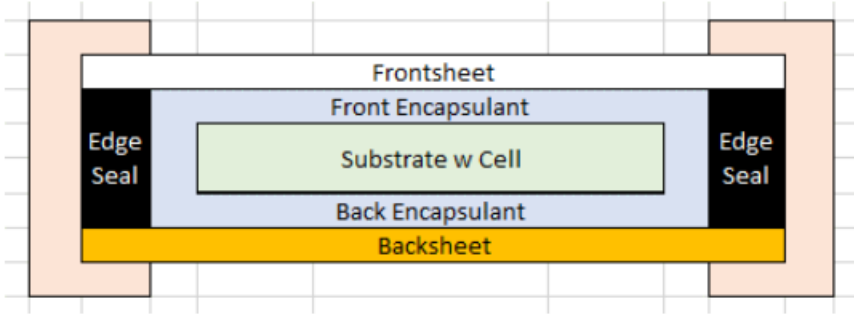
- Developing a production-ready process for solar integrated automotive polymer panel fabrication.
- Optimizing core tech for automotive applications

Solar module fabrication

- Material compatibility
- Module durability and lifetime
- Cost reduction of body panel

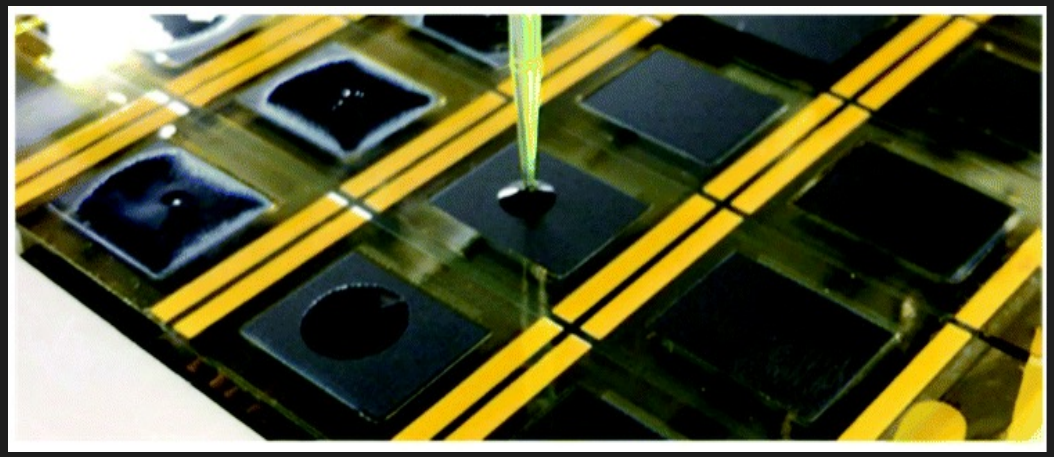
Automotive panel integration

- Extends vehicle range
- Reduces GHG emissions
- Alleviates range anxiety

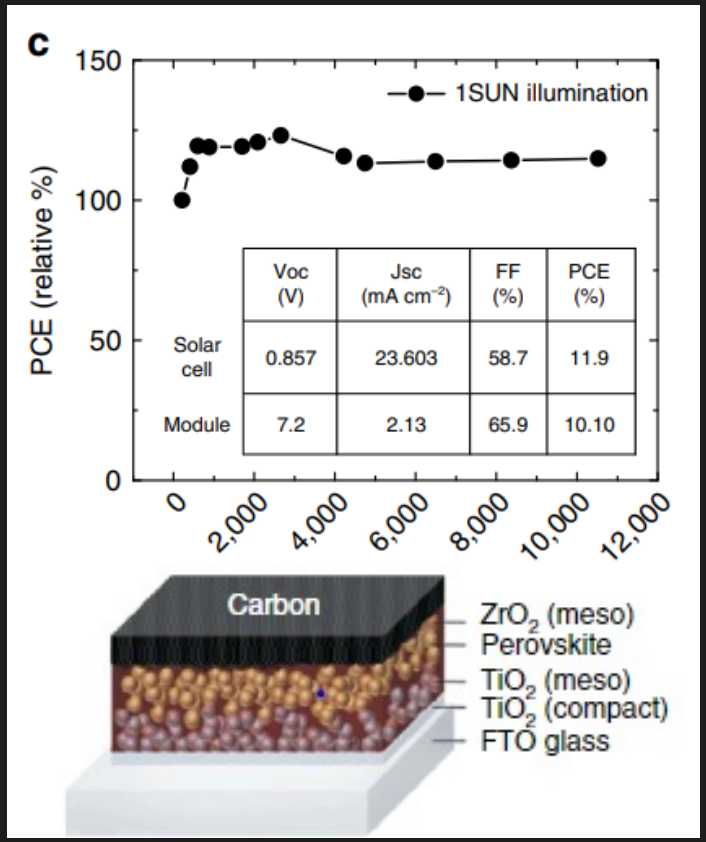


Carbon device stability

Mesoporous C-PSCs, legacy of high stability



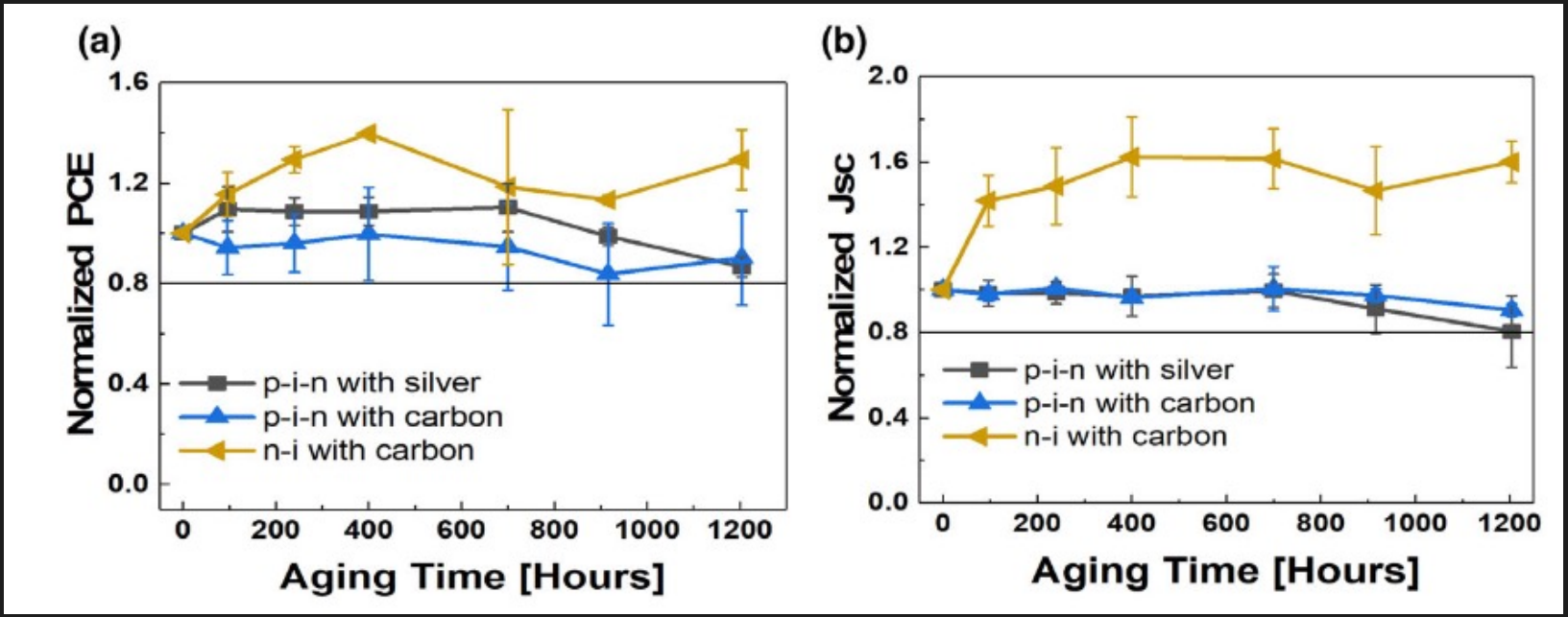
- Commonly exhibits PCE increase after a few 1000 hours of operation.
- Initial increase of PCE is highly dependant on cell stack, preconditioning.



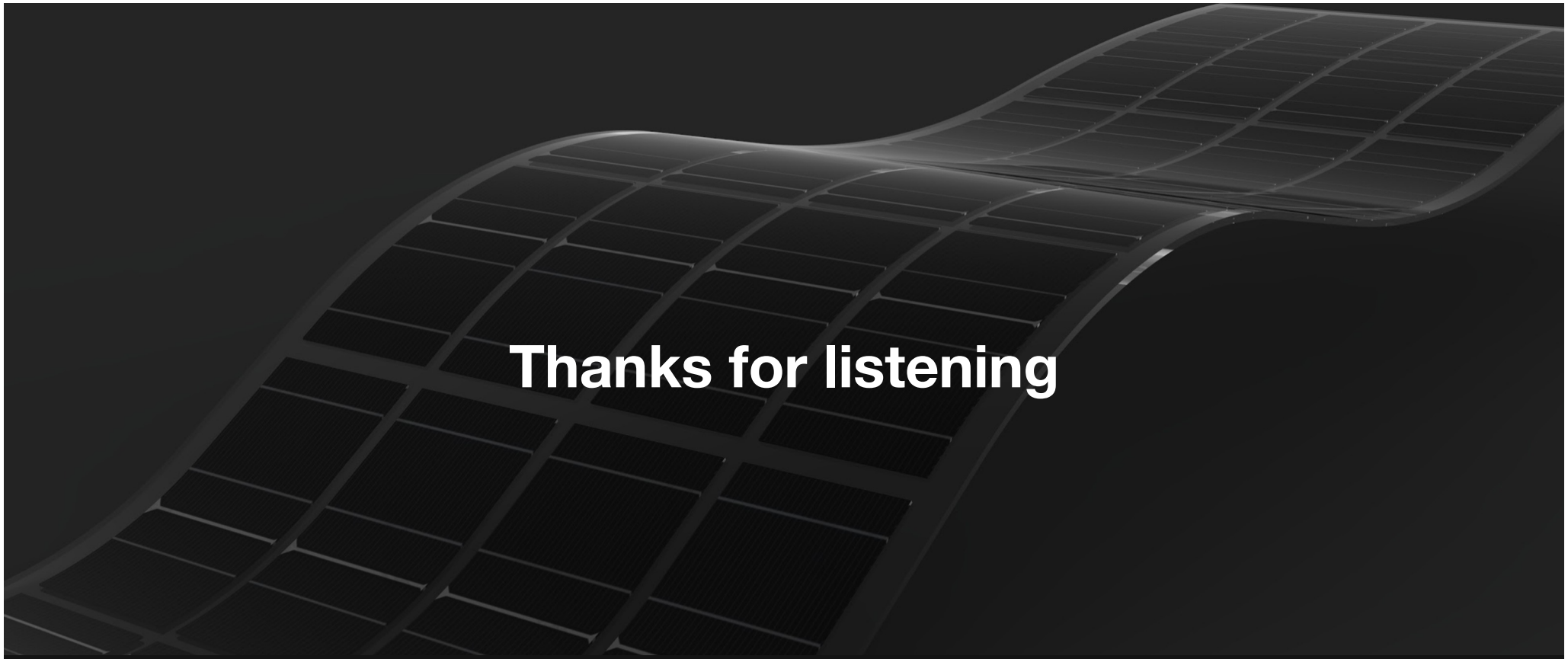
	Voc (V)	Jsc (mA cm^{-2})	FF (%)	PCE (%)
Solar cell	0.857	23.603	58.7	11.9
Module	7.2	2.13	65.9	10.10

Grancini, G et al. *Nature Communications 2017.*

Carbon device stability



Ahmad, T et al. *Energy and Environmental Materials*. 2022



Thanks for listening

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