

# Development of high power-to-weight ratio CIGS solar cells for space applications

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## 1. Introduction

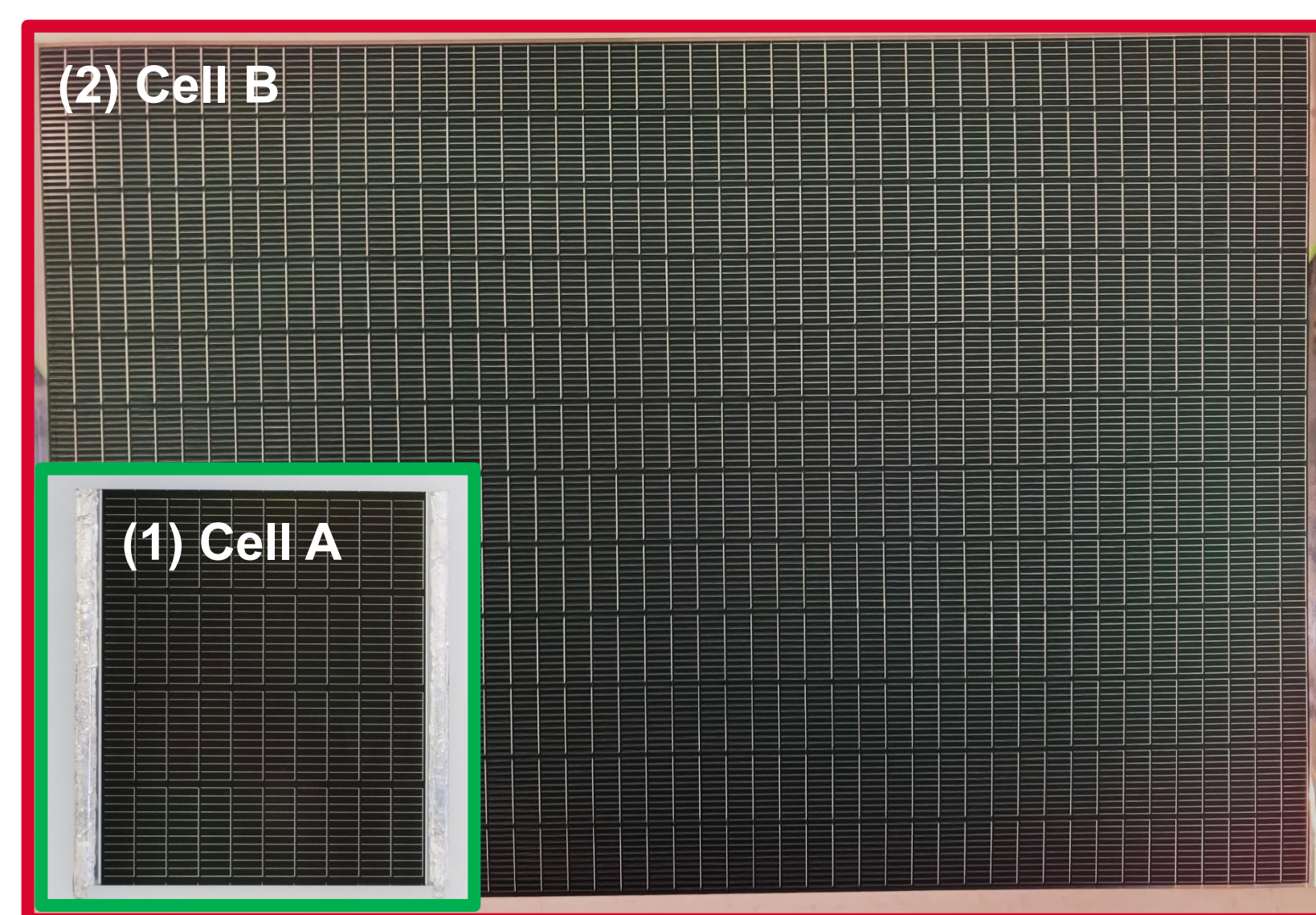
### CIGS solar cell:

- ✓ Ultra radiation-hard
- ✓ GW-scale mass production technology
- ✓ Reasonable cost

→ **A promising solution to the rapidly growing demand for space solar cells**

**CIGS solar cells on ultra-thin glass (UTG) are under development to realize high power-to-weight density for space applications.**

## 2. CIGS solar cell on UTG



Power output characteristics of CIGS solar cells fabricated on UTG (AM0, in-house evaluation).

	$\eta$ (%)	$P_{\max}$ (W)	$V_{mp}$ (V)	$I_{mp}$ (A)
Cell A	17.2	1.0	5.9	0.175
Cell B	14.2	11.2	23.5	0.475

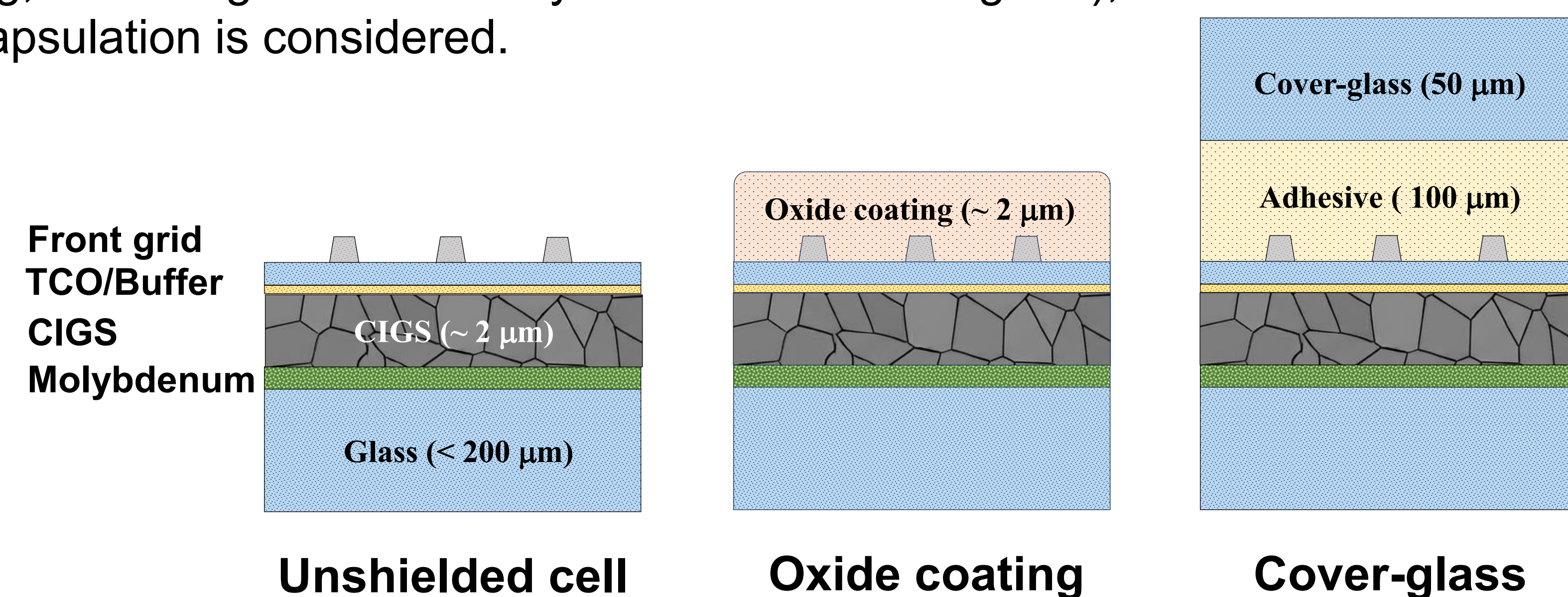
(1) Cell A: CIGS on 0.4 mm-thick UTG (7 cm x 7 cm, Active area ~44 cm<sup>2</sup>)

(2) Cell B: CIGS on 0.2 mm-thick UTG (20 cm x 30 cm, Active area ~579 cm<sup>2</sup>)

17.2% efficiency was demonstrated for CIGS on 0.4 mm UTG in the initial phase, followed by 14.2% for larger-area CIGS on 0.2 mm UTG.

## 3. Power-to-weight ratio of our CIGS

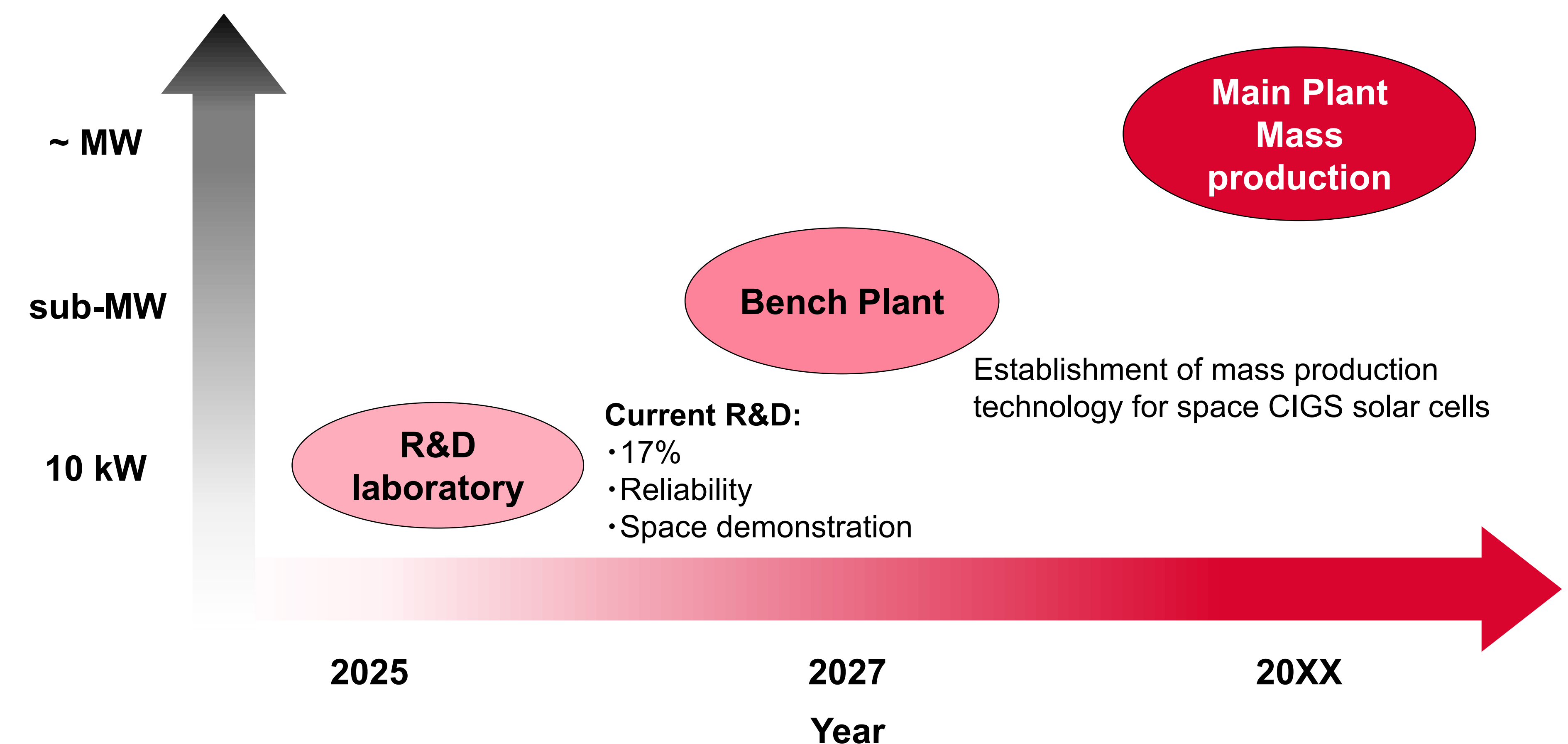
High radiation tolerance of CIGS enables thinner or no cover glass. Comparable to or exceeding 3J-GaAs CIC performance (~340 W/kg, assuming 30% efficiency and 0.1 mm cover glass), when encapsulation is considered.



	Unshielded cell	Oxide coating	Cover-glass
Total weight (g/cell*)	~ 34	~ 35	~ 50
Power-to-weight ratio (W/kg, AM0-17%)	~ 450	444	309
Thermal Emissivity (%)	~ 50%	75~80%	> 80%

\*Cell size : 260 mm x 270 mm (Candidate standard size at our future bench plant)

## 4. Next phase toward market entry



Idemitsu has made a final investment decision (FID) to establish **a bench plant for space CIGS mass-production validation.**



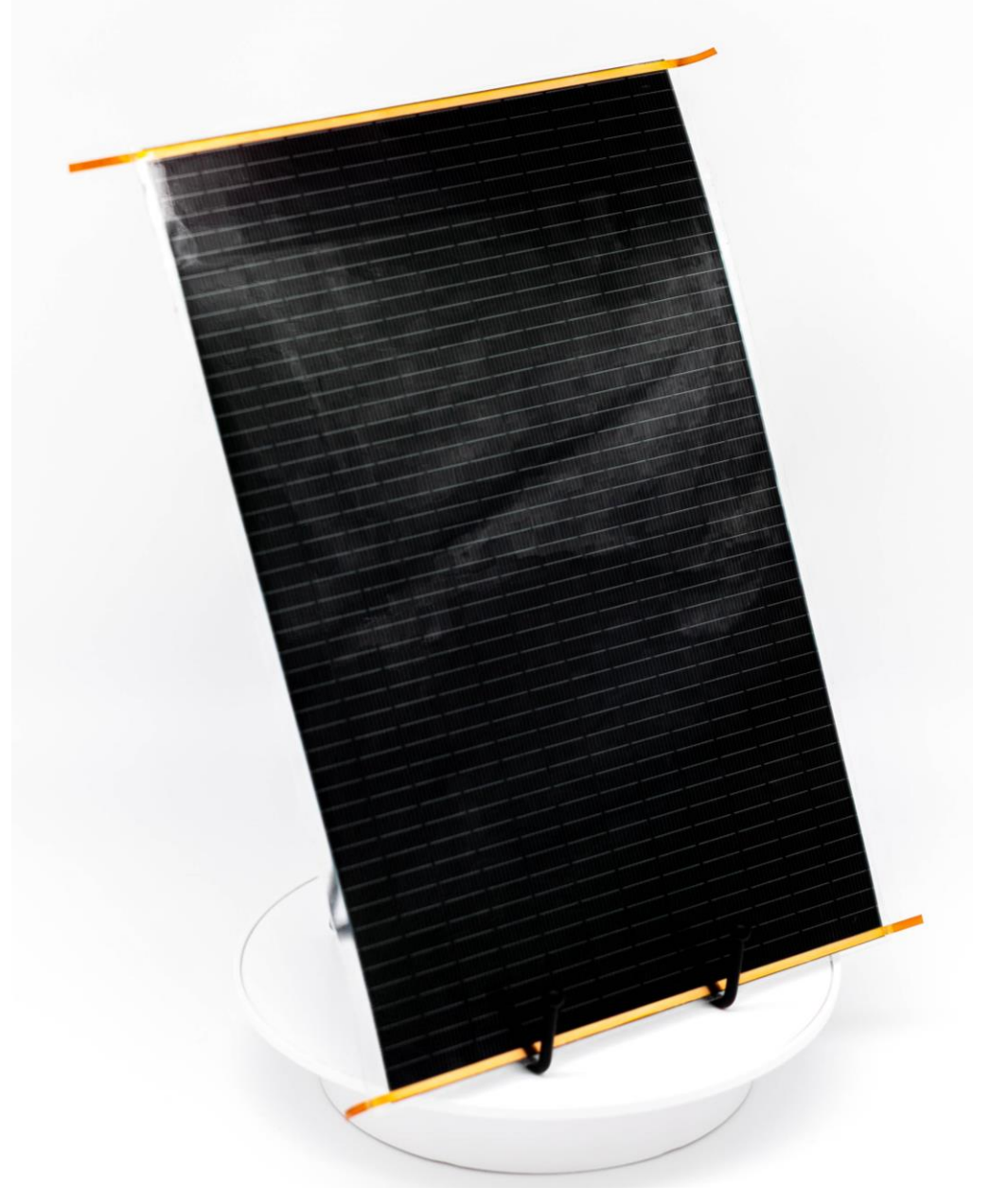
SPACE STRATEGY FUND

The project has also been selected for **JAXA's Space Strategy Fund.**

The bench plant will accelerate demonstration and technology development toward mass production.



Idemitsu and Source Energy are collaborating to co-develop and deliver next-generation energy solutions for the high-LEO and MEO markets. This collaboration will combine Idemitsu's proven CIGS solar cell technology with Source Energy's family of advanced solar modules and deployable arrays for satellites and spacecraft.



## Summary

- CIGS solar cells on ultra-thin glass are under development for space applications, with a confirmed conversion efficiency of 17.2%.
- Thanks to the superior radiation tolerance of CIGS, lightweight encapsulation structures are feasible.
- Final investment decision made to establish a space-grade CIGS bench plant.
- Early market entry is being pursued through collaboration with Source Energy.



Please visit our website:

<https://www.idemitsu.com/en/company/rd/cigs/index.html>

Cell evaluation samples available upon requests under NDA©