Perovskite Solar cells from SEKISUI Chemical Company

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Corporate R&D center

Acknowledgement

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Collaborators: Government, University and Institute

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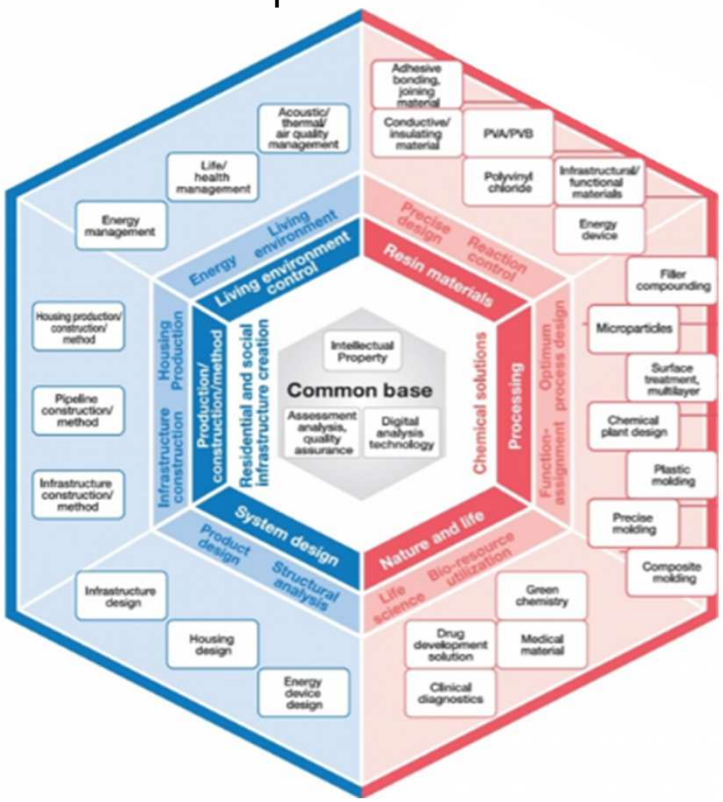
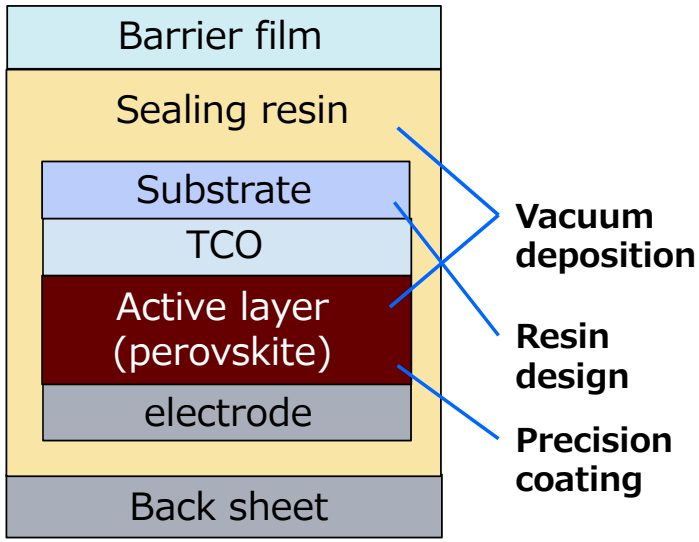
Technical Background of Sekisui Chemical Co., LTD.

- Solar cells filled with SEKISUI original technology･･･Strengths in “durability” and “manufacturing process”
- Started research around 2013, participated in NEDO project and started research and development in 2015



Company’s 2８technical Platforms is related and utilized

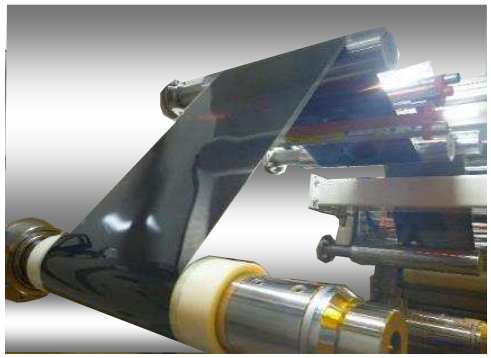
- **Sealing technology**
- **Process technology**
- **Material technology**
- **Deposition technology**

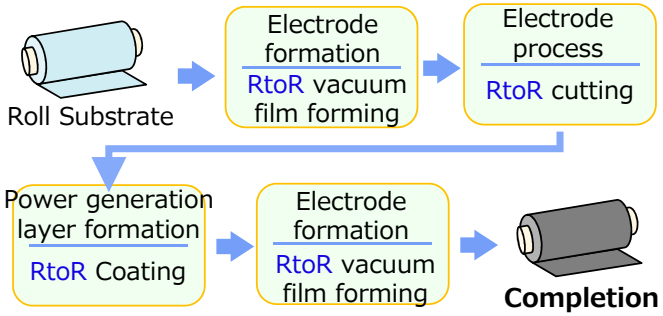


Cross section image of perovskite solar cell

The Progress of Roll to Roll fabrication process

Settlement of roll-to-roll element technology for 300 mm width



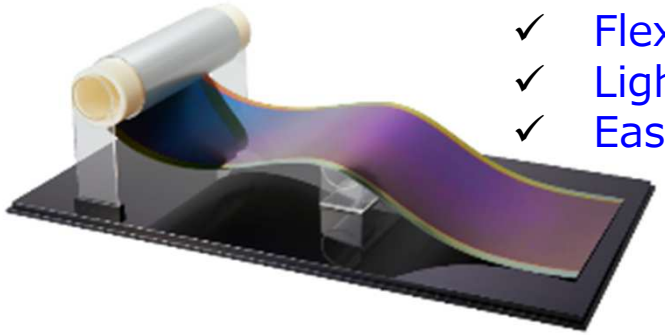


〈Roll-to-Roll manufacturing process〉

Confirmed outdoor durability for equivalent to 10 years

※ Compliant with IEC61215, a solar cell standard
Passed 5 major durability tests

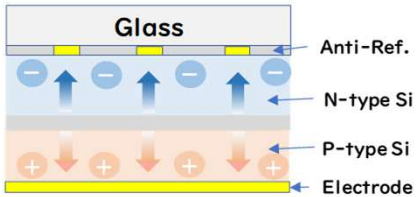
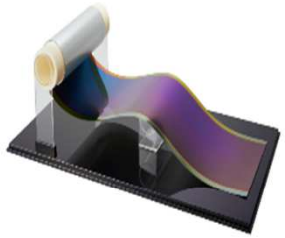
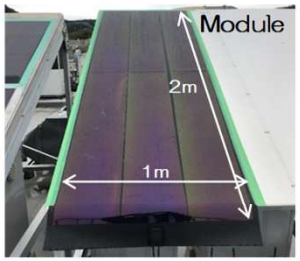
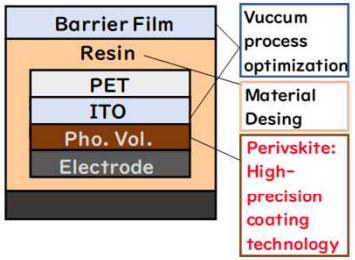
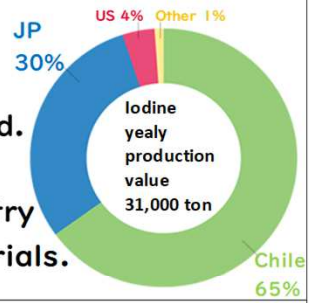
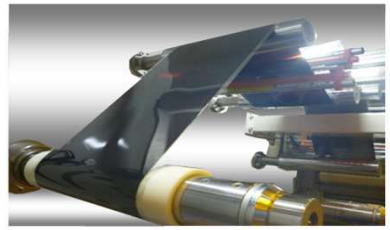
Achieved power conversion efficiency of 15.0%



Characteristics:
- ✓ Flexible
- ✓ Light weight
- ✓ Easy Installable

※ 300mm width R to R manufacturing

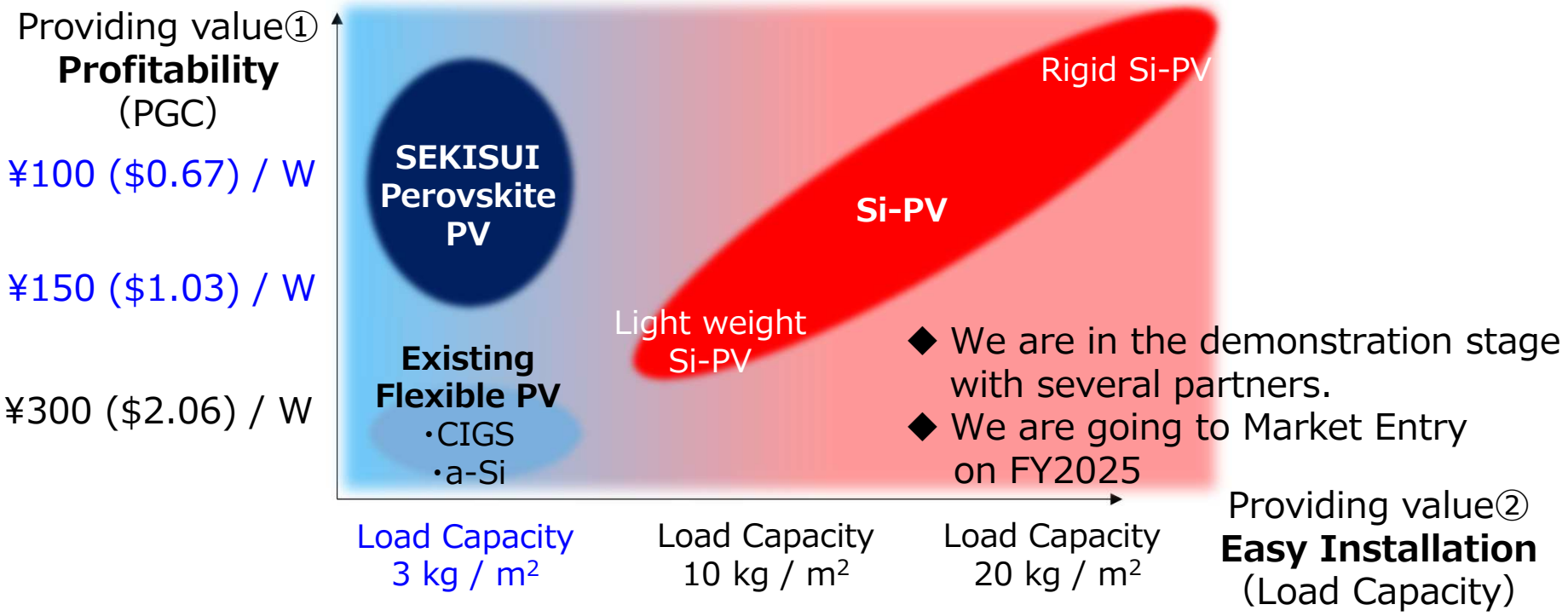
The Comparison between Si and Perovskite solar cell

	Si solar cell	Perovskite solar cell (Sekisui Co.,)	
		Current	Future
Efficiency	14 ~ 20%	15% →	20%
Durability	20 ~ 30 years (legal durable years: 17years)	10 years →	more than 20 years
Structure	 	  	
Contribution to domestic industry	●Dependency of Si sorce at overseas ① The Si source in the world is not uniformaly located, especially in Japan, all of Si sorce is imported from abroad. ② The factory of Si solar cell is few in Japan. ③ There is a risk of supply by unexpected incident.	○Stable supply of materials in Japan Perovskite Key Material: Iodine, Pb ① 30% of Iodine production in the world is from JP, cheap and stable supply of lead. ※Effort to Lead free system. ② Anticipation to not only domestic industry marcket but also abroad by low cost materials. 	
Life cycle assessment (LCA)	●Hige-LCA ①More than 1,500℃ at production process and transfer to Japan. → Lead to CO_2 emmisoin ②Long cycle time by many process, and need to more than 100 um thichness of Si. (1mm = 1,000um)	○Low -LCA ①Low LCA by easy mass production of Roll to Roll process line. ②Saving resource of material by less than 0.6um thickness of photovoltaic perovskite layer. 	
Weight	●Product weight: 10kg ~ 15kg/㎡ Solid and Heavy	○Product Weight: 2 ~ 3 kg/㎡ Flexible & Light → Easy installation to human life	

The Power Generation Cost (PGC)

Aim for PGC 20 yen (0.14$) / kWh

PGC is from the installation cost (i.e. equipment cost + construction cost) that is taken into account of power conversion efficiency and durability.



The Potential of company

Name	**SEKISUI CHEMICAL CO., LTD.**
Paid-up Capital	¥100,002 million
Net Sales	¥ 1,242,521 million ≒ $ 8.5 billion (for the term ending March 2023; on a consolidated basis)
Ordinary Income	¥91,666 million ≒ $ 630 million (for the term ending March 2023; on a consolidated basis)
Number of Employees	26,838 (for the term ending March 2023)
Location of Headquarters	Osaka Head Office 2-4-4 Nishitemma, Kita-ku, Osaka 530-8565 Japan Tel: +81-6-6365-4110
Location of Headquarters	Tokyo Head Office 2-10-4 Toranomon, Minato-ku, Tokyo 105-8566 Japan Tel: +81-3-6748-6460
Establishment	March 3, 1947
President	Keita KATO
URL	http://www.sekisuichemical.com

Osaka Head Office

Tokyo Head Office

The Business Diversity in Sekisui chemical company

The innovation and collaboration by own technology as cutting edge

Sustainable Society

from Sustainable Material

to Sustainable Energy

by Perovskite Solar Cell Development