



Perovskite Solar cells from SEKISUI Chemical Company

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Perovskite solar cell group
Corporate R&D center

Acknowledgement

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Collaborators: **Government**, **University** and **Institute**



経済産業省

The Ministry of Economy, Trade, and Industry of Japan (METI)



国立研究開発法人 新エネルギー・産業技術総合開発機構

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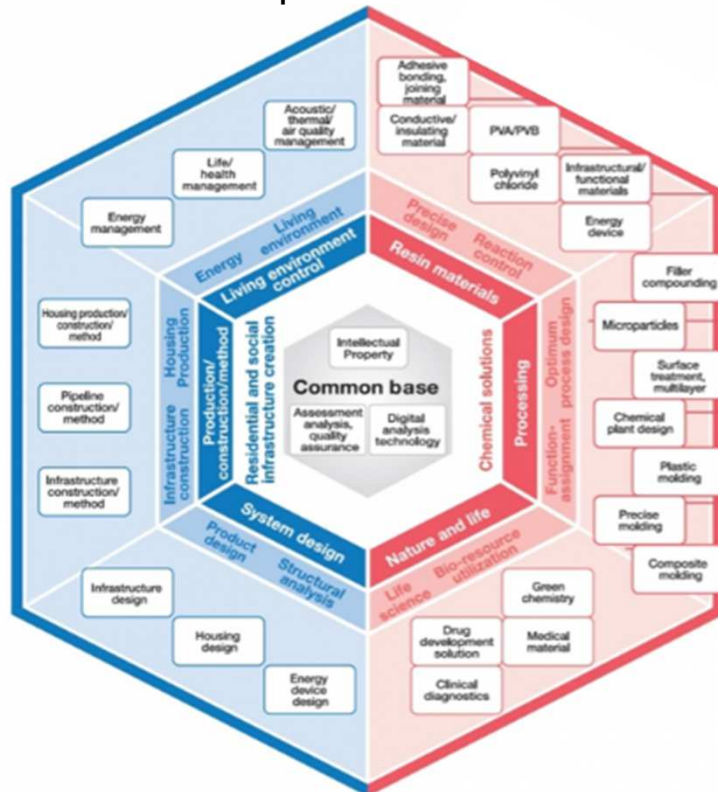
National Institute of Advanced
Industrial Science and Technology

Dr. Takurou Murakami

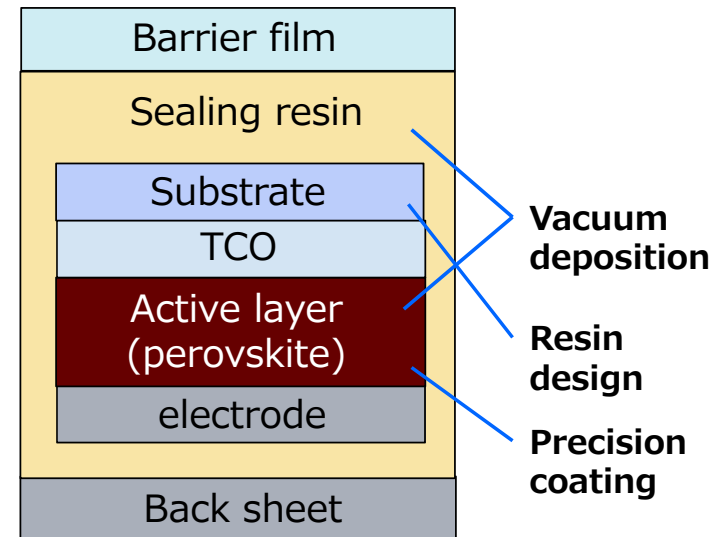
Technical Background of Sekisui Chemical Co., LTD.



- 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



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

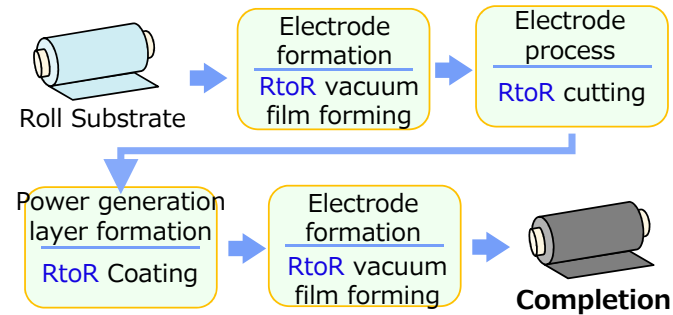


Cross section image of perovskite solar cell

Company's 28 technical Platforms is related and utilized

The Progress of Roll to Roll fabrication process

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



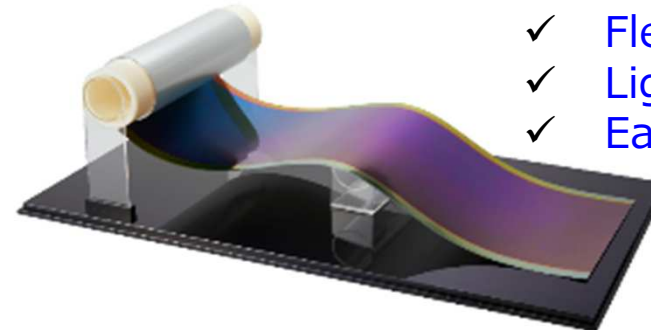
〈Roll-to-Roll manufacturing process〉

◆ 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

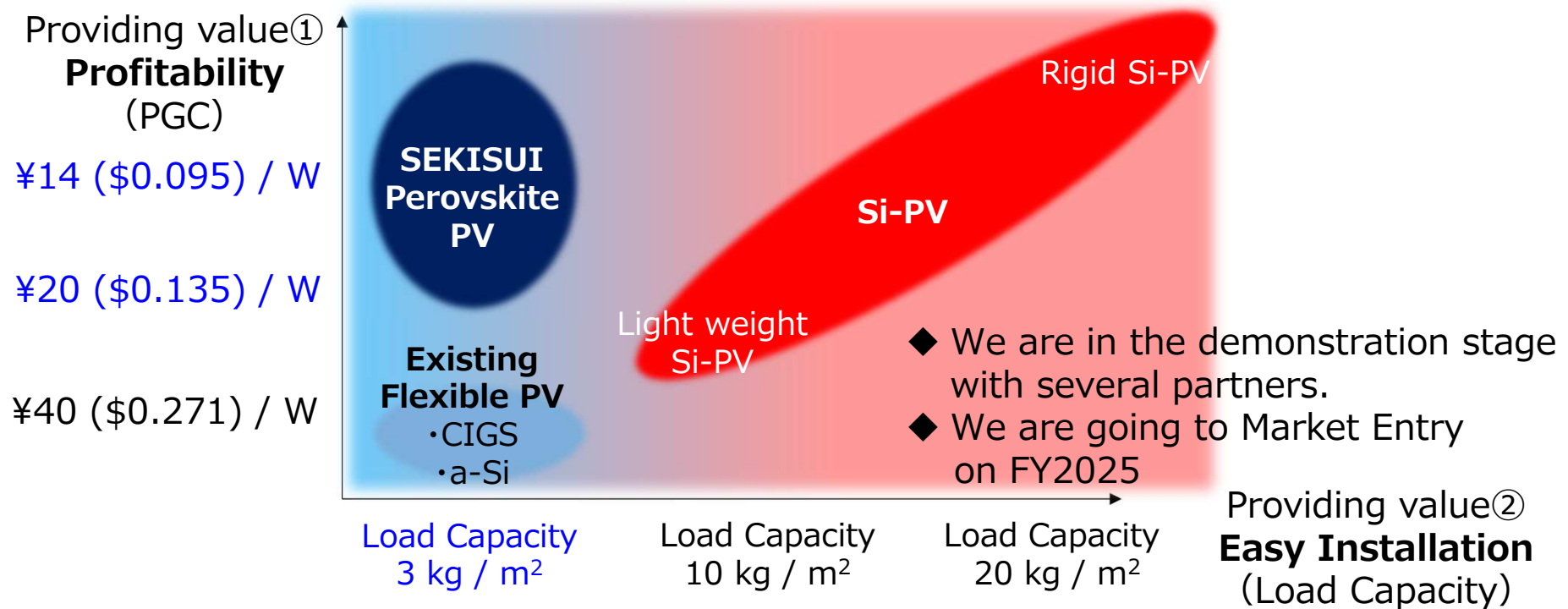
The Comparison between Si and Perovskite solar cell

	Si solar cell	Perovskite solar cell (Sekisui Co.,)	
		Current	Future
Efficiency	14 ~ 20%	15%	20%
Durability	20 ~ 30 years (legal durable years: 17 years)	10 years	more than 20 years
Structure			
Contribution to domestic industry	<p>●Dependency of Si source at overseas</p> <p>① The Si source in the world is not uniformly located, especially in Japan, all of Si source is imported from abroad.</p> <p>② The factory of Si solar cell is few in Japan.</p> <p>③ There is a risk of supply by unexpected incident.</p>	<p>○Stable supply of materials in Japan</p> <p>Perovskite Key Material: Iodine, Pb</p> <p>① 30% of Iodine production in the world is from JP, cheap and stable supply of lead.</p> <p>※Effort to Lead free system.</p> <p>② Anticipation to not only domestic industry market but also abroad by low cost materials.</p>	<p>Iodine yearly production value 31,000 ton</p>
Life cycle assessment (LCA)	<p>●Hige-LCA</p> <p>①More than 1,500°C at production process and transfer to Japan. → Lead to CO₂ emission</p> <p>②Long cycle time by many process, and need to more than 100 um thickness of Si. (1mm = 1,000um)</p>	<p>○Low -LCA</p> <p>①Low LCA by easy mass production of Roll to Roll process line.</p> <p>②Saving resource of material by less than 0.6um thickness of photovoltaic perovskite layer.</p>	
Weight	<p>●Product weight: 10 kg ~ 15 kg/m²</p> <p>Solid and Heavy</p>	<p>○Product Weight: 2 ~ 3 kg/m²</p> <p>Flexible & Light → Easy installation to human life</p>	

The Power Generation Cost (PGC)

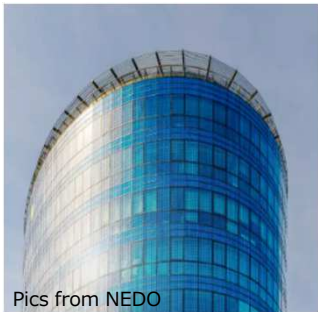
◆ **Aim for PGC 20 yen (0.14\$) / kWh**

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



The Film type perovskite solar cell – Pilot Test –

The Light and flexible Perovskite solar cells are suitable to be set at **new innovative demand.**



Pics from NEDO

**Building wall
(tie-up with NTT data)**



Airport & Harbor



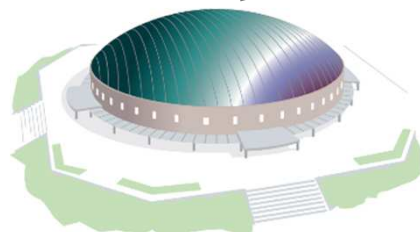
Rail way (tie-up with JR west)



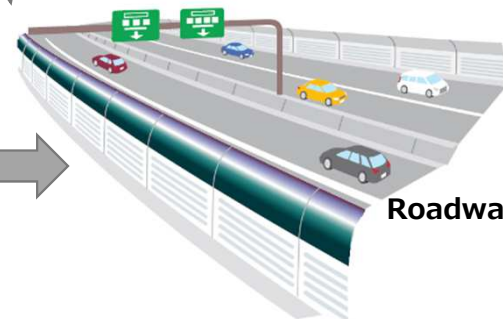
Bus shelter



**Lid of Sewerage Bureau
(tie-up with Tokyo metropolitan government)**



**Light roof top
(e.g. factory, gymnasium)**



Roadway

- Accumulated market size of Si solar cells → about 70GW (in Japan)
- Expected potential market size of Perovskite solar cells (in Japan) → 1.5-2 times larger than Si solar cells
- **Expected potential market size of Perovskite solar cells (World) → more than 10 times of Japan**

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 Toranomom, 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

SEKISUI