Solar Heat Dissipation Coat

Measures to prevent deterioration of power generation efficiency due to overheating of PV panels

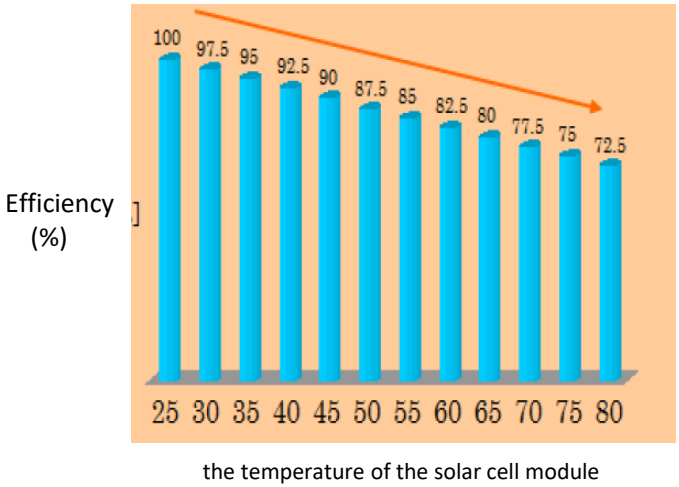
◆Problem of output reduction due to overheating

The Solar panels have a characteristic as follow.

① It will increase output when the surface temperature of panel will come to be lower.

② It will decrease output when it will come to high temperature.

That is, even if it is received in the panel of the same area of the same light intensity,
Output changes depending on the temperature of the panel. By international standards,
Catalog performance of solar panels, are supposed to be measured at 25 degrees.
Power generation capacity from 0.4 to 0.5 % per degree will change as performance standard of the 25 degrees.
That is the case of 35 degrees, a temperature difference of 25 degrees is 10 degrees.
It will be the amount of power generation 4-5% is down compared with 25 degrees.
In addition, the aged deterioration of the panel itself due to thermal expansion and contraction has become a problem in areas where the temperature exceeds 40 ℃.



Relationship of power generation efficiency and the temperature of the solar cell module

◆Heat radiation technology

In order to suppress temperature rise, technology to release heat (heat dissipation technology) is necessary.
Heat is transferred in the form of conduction, transmission, and radiation.
At our company, by mixing SWCNT (single-walled carbon nanotube) with the best thermal conductivity and emissivity with room temperature inorganic binder = SGB binder,
We have succeeded in developing a heat-dissipating coating that can be applied to various substrates.
As the most important point for improving the performance of heat dissipation coating
*There is an air problem in the thermal conductivity in Table 1.
Air (voids) remaining in the paint film or on the adhesive surface is a factor that prevents heat dissipation due to its heat insulating effect. The organic dispersant that uses SWCNT as a solvent also causes thermal resistance and voids after deterioration over time.
Sketch uses CNTs with as few pores as possible, high thermal conductivity,
and no organic dispersants in the particles that fill the gaps between SWCNTs.
For this reason, we have formed a coating film with few pores
and improved heat dissipation properties.

Carbon nanotubes are more than 15 times more thermally.
conductive than aluminum.
Excellent heat dissipation effect.
Easy to heat up, easy to cool down.

Thermal Conductivity	
Material	(W/m･K)
CNT	3000～5500
Diamond	1000～2000
Ag	428
Cu	403
Au	319
Al	236
Fe	168
Stainless	16.7～20.9
SiO2 (Crystal)	8
glass	1
PC	0.24
Acrylic	0.21
Air	0.0241

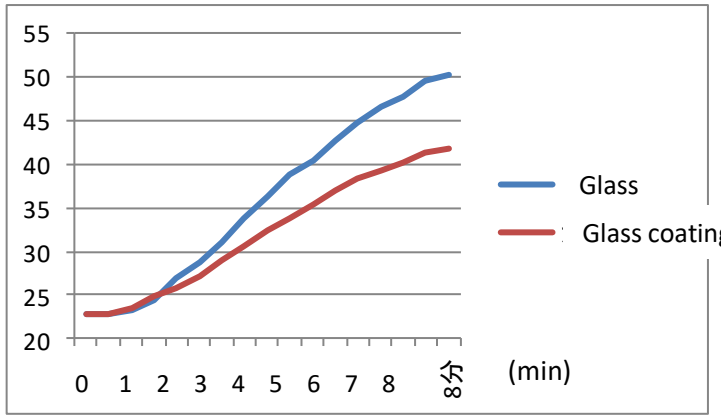
Table 1.

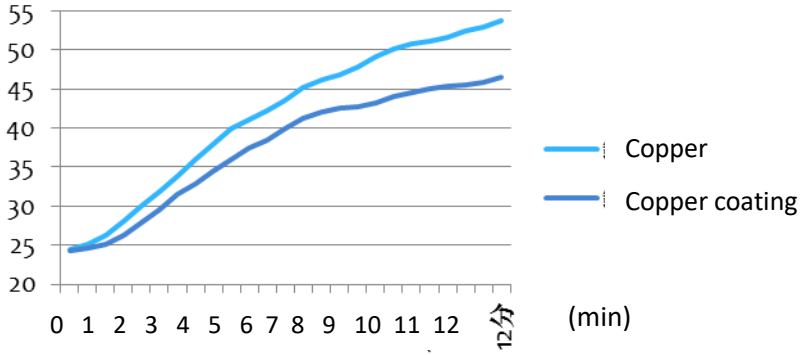
◆The feature of Solar heat dissipation coat

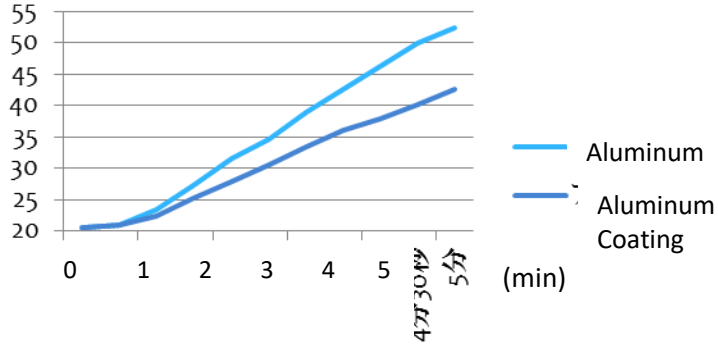
Solar heat dissipation coat is a coating agent that can be applied at room temperature with heat dissipation, antistatic, abrasion resistance, and chemical resistance characteristics by using SWCNT. By applying it to the back surface of the solar panel (back sheet), it suppresses the increase in panel temperature = the decrease in power generation efficiency.

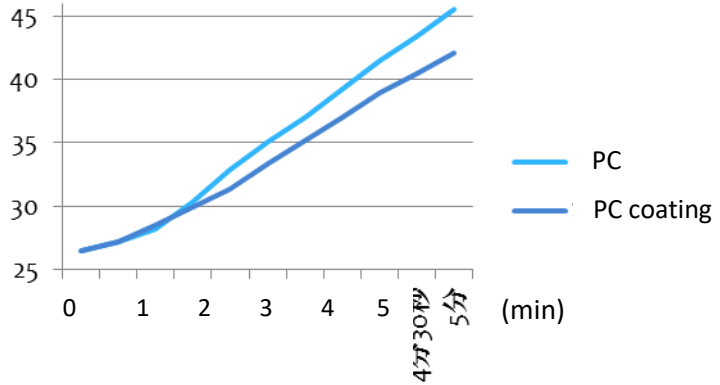
Power generation efficiency drops by 0.5% for each 1℃ above 25℃, the efficiency drops by 10% at 45℃.

Heat radiation effect of each substrate



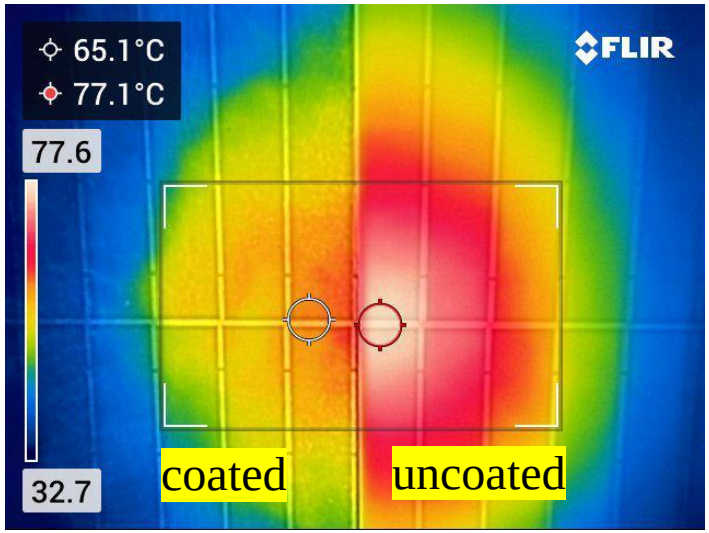


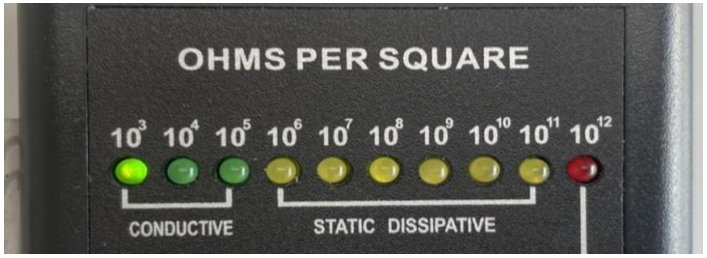




Solar heat dissipation coat for Back Sheet

12℃ difference

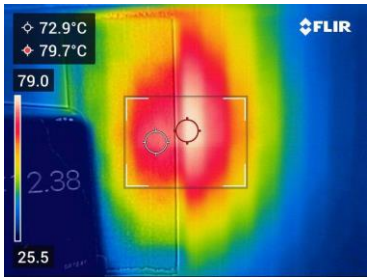


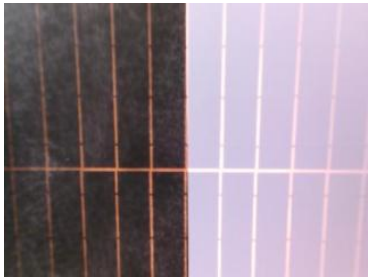


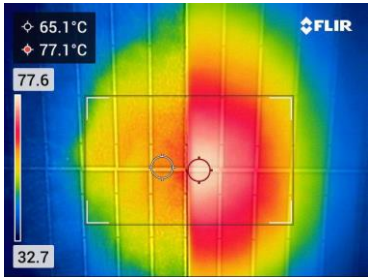
$10\Omega^{3\sim4}$ on the surface resistivity meter.

Product with improved coating solution
for Solar Self-Maintenance Coated CNT

1. Application using dedicated rollers
   20 g of water retention of the roller
2. It can be applied 50㎡ with 1L
3. Apply 20g per square meter
4, Coating application after cleaning back sheet with alcohol
5, A worker can apply to coat 100㎡ with 8 hours
6, It dries in 15 minutes after application







New product announcement

Japanese Patent No.7146223
“Antistatic coatings, antistatic glass substrates, and solar panels”

特　許　証
(CERTIFICATE OF PATENT)

特許第７１４６２２３号
(PATENT NUMBER)

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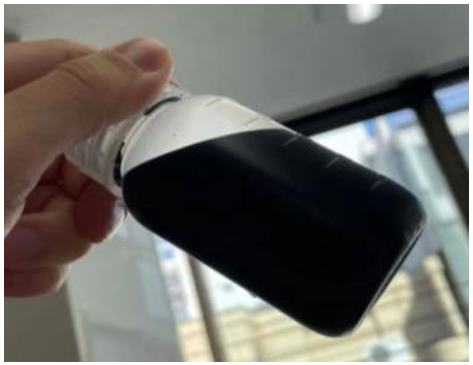
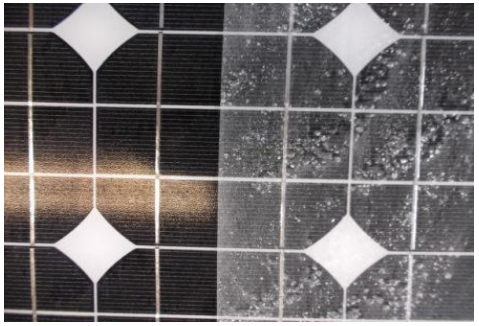
この発明は、特許するものと確定し、特許原簿に登録されたことを証する。
(THIS IS TO CERTIFY THAT THE PATENT IS REGISTERED ON THE REGISTER OF THE JAPAN PATENT OFFICE.)

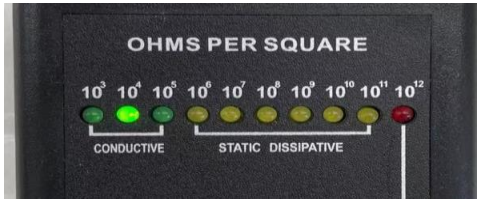
令和　４年　９月２６日(September 26, 2022)

特許庁長官 (COMMISSIONER, JAPAN PATENT OFFICE)　濱野幸一

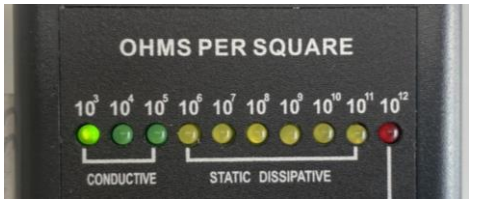
Solar Self Maintenance
Coat CNT
&
Back Sheet Heat
Dissipation Coat







10Ω4~5 on the surface resistivity meter.



10Ω3~4 on the surface resistivity meter.