For PV Aqueous Ceramics Coating

Characteristic of M-50CP

Super hydrophilic function effect (self-cleaning effect , cooling)
Improved near infrared ray take in
Improved diffuse light take in

Outline of M-50CP

It is a special liquid ceramics compound which is dispersion of 3 to 20nm particle of
Silicon dioxide into the water together with inorganic additives (patented) as to work for adhesion to substrate.

Adhesion of membrane

Substrate of Glass surface looks completely flat state, however it has a lot of micro convexo-concave state.
M-50CP can make membrane to embedding into that micro convexo-concave of glass surface.

＜Inorganic substrate＞

Surface of glass has a OH radical (hydrophilic radical)、therefore, it is easy to adhere the M-series (made from main ingredient of silicon dioxide) which has a the same family of radicals and inorganic additive works more adhesion strength.
Membrane is not easy removed due to ion bonding although so thin of membrane about 50nm.

＜Ion bonding＞

Adhesion M-50CP is very strong by hetero bonding as Si-O, as like Si is bonded to OH radical of surface of glass, then forms Si-O-Si bonding (call Siloxane bond)
M-50CP of water born inorganic coating agent (absent from any organic materials) has no element of influence from ultraviolet, temperature, humidity and friction at all.
However, it is not possible to protect from sand storm environment (like sand blast state) in use of desert because of so thin membrane like 50nm.

Theory of antifouling by hydrophilic

Mechanism of hydrophilic function is, to absorb the humidity in atmosphere by additives (it has a function beside of adhere strength) and keeps thin water membrane by silicon dioxide particles in the membrane. Therefore, even dirt coming on the membrane. Dirt are just on the thin water membrane. So that, additional water intervened such as rain, dirt on the thin water membrane to be washed away.
It is not considerable that there are no humidity in atmospheres; therefore M-50CP membrane always forms thin water membrane.
To controls of absorption volume of humidity on the membrane, for example of normal fine day , Water membrane to be less water absorption due to low humidity, However, it is possible to intervene the volume of water to make hydrophilic state.
M-50CP of membrane surface has a lot of nanometer textures, and it makes enlarge of their surface area, and shows water contact angle makes lower below 5 degree once more water on the membrane.
Therefore, the dirt on the glass surface flow out to the incline direction once rain.

Theory of improvement of transparent ratio:

It is considered that there are many elements of improvement for power generation volume technology of the PV module other than just improvement of cover glass transparency ratio
Generally, power generation volume is indicated w/h・w/d, but formally, it is necessary to consider the diffuse light such as morning sun light , sun set sun light and clouding, rain day's sun light too but not maximum moment power generation efficiency (at 1000w/㎡)
How to improve the efficiency of diffuse light is the subject among the PV module manufactures said. (The certain manufacture's research)
Now, M-50CP offers how to solve this subject with form up the nanometer texture on the cover glass surface, and those the various incidents light, diffuse light and horizontal light are bringing on to PV cell surface.

＜Improvement of power generation volume by M-50CP＞

Most effected wavelength of Crystal system module is from 350nm to 800nm, and it will be declined the effectiveness above 800nm.
But, M-50CP' nanometer texture has a more capability to transmission of those near infrared rays（800nm～1200nm）which is generally considering of low efficiency of power generation effected wavelength,
However, nanometer textures have no extra efficiency shown compared with non coating glass at the visible ray with right angle incident light.

＜Improvement of power generation efficiency by diffuse light＞

It is possible to make generation working hours longer a day compared with non coated PV cover glass due to taking in the diffused horizontal light(irradiation volume of 200 to 500w/㎡） into glass inside by nanometer texture form compared with non coatings.
However, it is not come out the efficiency of improvement clearly measured by simulator
Because, it is a way of measurement by direct right angle incident but not diffused light.