


## **Technical description Ceracoat Ceramic self-cleaning coating for solar panels**

**CERACOAT ceramic glass SC coating** is a water-based system that protects PV panels from dirt and improves the light output. The applied material creates a hydrophilic film just a few nanometers thick on the surface. The self-cleaning process of the surface is generated by a photocatalytic process in the presence of natural sunlight. The surface tension in relation to condensed water is reduced above the air/water value, which results in the condensate running off completely (spreading).

Sun + rain clean the panels coated with **Ceracoat Ceramic SC coating** for years. Expensive cleanings and major loss of electricity production (due to dirty panels) are eliminated.

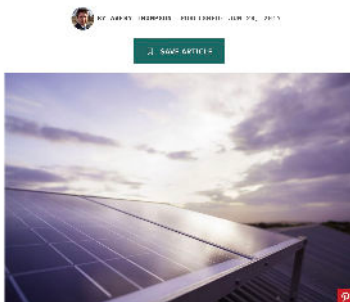
This breakthrough technology is a game-changer for the PV industry! There is a decomposition of the dirt by the sun (photocatalysis) and a wash-away by the rain (super-hydrophilic ceramic coating). Each rain fall is a free cleaning session for the panels. Additionally, the ARC is protected by the ceramic coating!



Using several  self-cleaning coating on photovoltaic (PV) panels offers advantages:

### **Pollution Could Block 25 Percent of the Light That Would Become Solar Power**

Now research finds that a combination of airborne pollution and dust buildup can cripple solar installations.



- **Maintained Efficiency:** Accumulation of dust, dirt, or other contaminants on PV panels can reduce their efficiency by blocking sunlight. Our self-cleaning coating helps to mitigate this issue by automatically removing or repelling such particles, thereby maintaining optimal performance.
- **Reduced Maintenance Costs:** Traditional cleaning methods for PV panels often require manual labor or specialized equipment, which can be costly and time-consuming. Ceracoat ceramic self-cleaning coating eliminates the need for frequent manual cleaning, thus saving on maintenance expenses.
- **Increased Energy Production:** By keeping PV panels clean and free from obstructions, our self-cleaning coating ensures maximum exposure to sunlight, leading to higher energy production over time. This can be particularly beneficial in areas with high levels of dust or pollution.
- **Extended Lifespan:** Regular cleaning and maintenance can contribute to wear and tear on PV panels over time. Our self-cleaning coating helps to avoid the need for abrasive cleaning methods, thereby potentially extending the lifespan of the panels and reducing the risk of damage.
- **Environmental Benefits:** Our self-cleaning coating typically uses environmentally friendly ceramic materials and methods to keep the panels clean, and is water based! By reducing the need for water and detergents in cleaning processes, this coating helps to minimize the environmental impact associated with PV panel maintenance.
- **Improved Aesthetics:** Clean PV panels not only function more efficiently but also look better. Our self-cleaning coating helps to maintain the visual appeal of solar installations by preventing the buildup of dirt and grime, enhancing the overall appearance of the panels and the surrounding area.
- **Enhanced Reliability:** Clean PV panels are less prone to issues such as hot spots or shading, which can affect their performance and reliability. Our self-cleaning coating helps to ensure consistent operation and minimizes the risk of downtime due to panel contamination.

Overall, the use of Ceracoat ceramic self-cleaning coating on PV panels offers a range of benefits, including improved efficiency, reduced maintenance costs, extended lifespan, and environmental sustainability.

**These advantages makes Ceracoat ceramic self-cleaning coating a GAME CHANGER for solar energy systems across various applications.**

## **Application process:**

### **Preparation: Dirty panels already installed**

The surface is carefully cleaned of dirt, oil and grease. Organic cleaners (universal cleaners or Ceracoat cleaner for PV panels) and alkaline or acidic surfactant cleaners are recommended. Then rinse with enough water to remove any surfactant residue. The cleaned surfaces must be clean, dry and free of grease before coating.

### **New panels:**

Cleaning is not necessary for new panels. Just spray the coating on the surface (20 ml per m<sup>2</sup>). Nothing else to do!

### **Coating:**

The coating is carried out by homogeneous application with a spray mist device (by machine or manually using the spray process), after which no polishing is necessary.

### **Drying:**

Depending on the climatic conditions, the hardening occurs after approx. 24-48 hours when exposed to the outdoors under sunlight.

Depending on the sun's rays, the self-cleaning effect is activated within approx. 2-4 weeks.

### **Dilution: None (ready to use product)**

Application quantity: approx. 20 ml. per m<sup>2</sup>

Hardening/drying: At least 1 hour to dry, then 24-48 hours for hardening Processing under UV/sunlight.

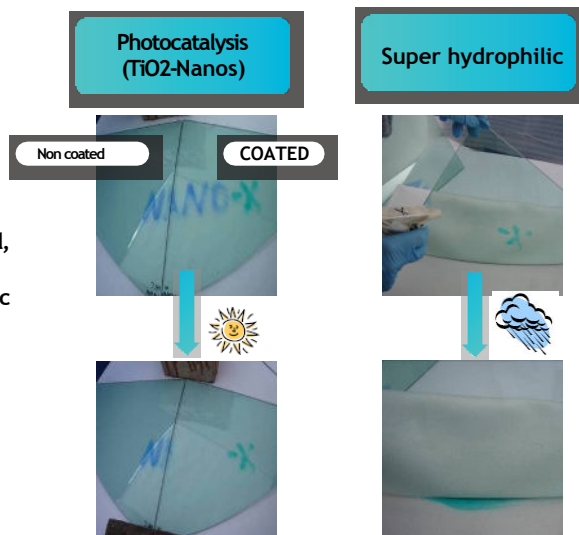
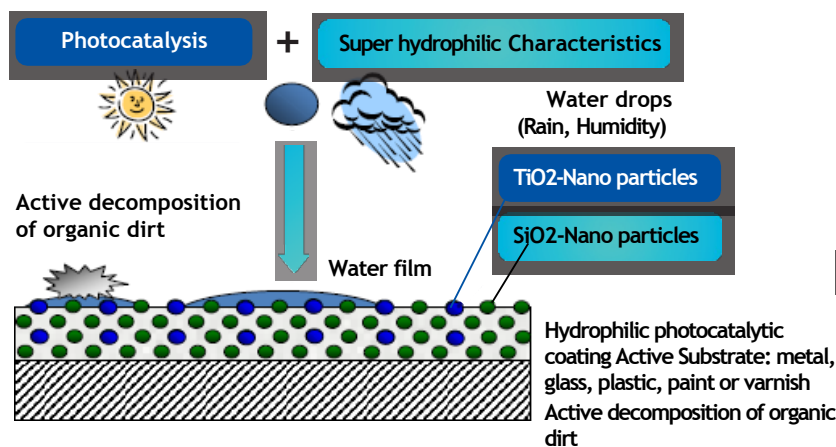
**Best application temperature:** +5°C to +25°C - protect from direct sunlight

**Storage and shelf life:** 6 months from opening, 12 months in sealed containers

Storage temperature: +5°C to +25°C, protect from direct sunlight and frost, store tightly sealed in the original container

# Active self-cleaning Coating

Photocatalytic (hydrophilic) coating



- Coating properties similar to a purely hydrophilic coating
- Nanostructure in the range from 20 to 50 nm => "inverse lotus effect" / super hydrophilic self-cleaning coating
- Undermining and rinsing off inorganic/organic dirt

- PLUS: additional photocatalysis with TiO<sub>2</sub> nanoparticles :  
UV light (direct/indirect sunlight)  
Decomposes organic impurities in the adhesive with TiO<sub>2</sub>

Leibniz  
Universität  
Hannover

Fraunhofer

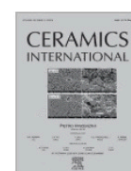
Presentation «Photocatalytic Coatings» CERACOAT CERAMIC

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Ceramics International

Volume 49, Issue 2, 15 January 2023, Pages 1678-1689



Enhanced photocatalytic activity of highly transparent superhydrophilic doped TiO<sub>2</sub> thin films for improving the self-cleaning property of solar panel covers



### **Easy and quick application of Ceracoat ceramic self-cleaning coating for Solar Panels**

#### **Application on Dirt panels**

- 1) Cleaning
- 2) Rinsing with water
- 3) Drying
- 4) Spraying coating-liquid on panels - about 20 ml per m<sup>2</sup>
- 5) Finish, nothing else to do, no polishing, nothing else to do
- 6) Coating will be dry quickly, hard after 24-48 hours, self-cleaning effect activated by the sun within 2 -4 weeks
- 7) Sun & Rain will clean the panels

#### **Application on New panels**

- 1) Spraying coating-liquid on panels - about 20 ml per m<sup>2</sup>
- 2) Finish, nothing else to do, no polishing, nothing else to do
- 3) Coating will be dry quickly, hard after 24-48 hours, self-cleaning effect activated by the sun within 2-4 weeks
- 4) Sun & Rain will clean the panels



Application of Ceracoat Ceramic self-cleaning coating for PV panels

**What is the Ceracoat ceramic self-cleaning coating for solar panels?**

**CERACOAT ceramic glass SC (self-cleaning) coating for PV systems (self-cleaning)**

**CERACOAT ceramic glass SC coating** is a water-based system that protects PV panels from dirt and improves the light output. The applied material creates a hydrophilic film just a few nanometers thick on the surface. The self-cleaning process of the surface is generated by a photocatalytic process in the presence of natural sunlight. The surface tension in relation to condensed water is reduced above the air/water value, which results in the condensate running off completely (spreading). Sun + rain clean the panels coated with **Ceracoat Ceramic SC coating** for years. Expensive cleaning and major loss of electricity production (due to dirty panels) are eliminated.

**How much liquid do you need per m2 and when to spray on the panels?**

You need just about 20 ml per m<sup>2</sup>, means with 1 Liter you can coat around 50 m<sup>2</sup> of surface. The best temperature range to coat the solar panels is from +5°C to +25°C.

**What happens if you spray when it is colder or hotter temperature?**

If you coat beyond +5°C, this is not a problem, but the drying time will be longer. If you coat above +25°C, this is not a problem either, but the drying time will be shorter and you will perhaps use a bit more than 20 ml per m<sup>2</sup> to be sure, the whole solar panel is covered with Ceracoat ceramic self-cleaning coating when you spray the liquid on the panels.

**What happens if you coat in the direct sunlight?**

It is best not to coat (= spray on the panels) in direct sunlight, but if you do that, that's not a problem but again, you may then use more than 20 ml per m<sup>2</sup>.



## **How do you apply Ceracoat ceramic self-cleaning coating for solar panels?**

### **Apply on already installed / used / dirt solar panels**



To apply the coating, the panels have to be clean. So, for already installed / used / dirt panels, you have to clean them first. Do a normal cleaning of the panels, by using a universal organic cleaner or Ceracoat cleaner for solar panels. You can also use alkaline or acidic surfactant cleaners. After the cleaning, you have to rinse the clean panels with water to be sure not to have any surfactant rest on the clean panels. Then wait until the panels are dry. The panels have to be clean and dry before you can apply Ceracoat Ceramic self-cleaning coating for solar panels.

Now you just spray the coating-liquid by homogenous application on the panel. Remember, just about 20 ml are enough per m<sup>2</sup>. Make sure there is liquid on the whole panel, that the whole panel is humid. You can spray the liquid with any trigger spray, spraying machine or whatever you like.

*If too much coating has been sprayed (20 ml per m<sup>2</sup> is enough) you can often see a film or stains. But it's not a big deal, the effect still occurs. You can also actively wash off the film with water and a microfiber cloth, but this is unnecessary because the first rain will wash off the excess material.*

Spraying is easy and quick: Easy application

<https://www.youtube.com/shorts/eylwbGXtPpM>

## **Apply on new panels before installation of the panels**



New panels do not need to be cleaned. When you take the panel out of his carton, out of his

packaging, just spray the coating-liquid by homogenous application on the panel. Remember, just about 20 ml are enough per m<sup>2</sup>. Make sure there is liquid on the whole panel, that the whole panel is humid. You can spray the liquid with any trigger spray, spraying machine or whatever you like to spray the liquid on the panels.

## **What do you have to do after coating / spraying the liquid on the panel?**

Nothing. After spraying, your job is done, nothing else to do. No polishing, nothing else. Depending on the climate conditions, the coating will dry quickly and be hard after 24-48 hours when exposed under sunlight. If you coat panels and put them back into their packaging, the coating will dry and become hard in the packaging.

Depending on the sun rays, the self-cleaning effect is activated by the sunlight within approximatively 2 to 4 weeks. Dirt or rain will not affect the coating. The coating will become dry, hard, active.

## **Cleaning of the coated solar panel**

No cleaning is necessary any more. The sun and the rain will clean the panels that are coated with Ceracoat ceramic self-cleaning coating. There is a decomposition of the dirt by the sun and then, the rain will wash away the dirt. If there is no rain, you can replace the rain by rinsing the panels with water.

Since dirt, bacteria and limescale are washed away by the coating in combination with moisture and UV light, cleaning is no more necessary for a long time (several years).



### ***How can the panels look like after coating?***

After coating the panels, it's possible that you see a mat film. It can even look this like (see below) if you use too much product (remember, just about 20 ml per m<sup>2</sup>). This is not a problem because after the first rainfall, the rain will wash away the excess material.

We created the water based self-cleaning coating to be ***extremely easy to apply***: Only spraying on the surface, nothing else (the sun will dry it within 24-48 h, the sun will activate it within 2-4 weeks, the rain will wash the excess material away).

If for a demonstration you want to show panels without this „mat film“, you can polish the coating after spraying with a cloth, to avoid this look, but we do not recommend this. Let the nature do the job and be patient!

