

# TIPE™ NANO COAT SELF-CLEANING

## BASIC INFORMATION

### Overview

The TiPE self-cleaning nano coat is a special nano photocatalyst coat combined by photocatalyst and nano technology.

Generally, detergents reduce the surface tension of water and the contact angle will be lowered. When the surface of nano level photocatalytic film is exposed to light, the contact angle of the photocatalyst surface with water is reduced gradually. After enough exposure to light, the surface reaches super-hydrophilicity. In other words, it does not repel water at all, so water cannot exist in the shape of a drop, but spreads flatly on the substrate. The hydrophilic nature of titanium dioxide, coupled with the gravity, will enable the dust particles to be swept away following the water stream (rain), thus making the key feature of self-cleaning and easy-cleaning.

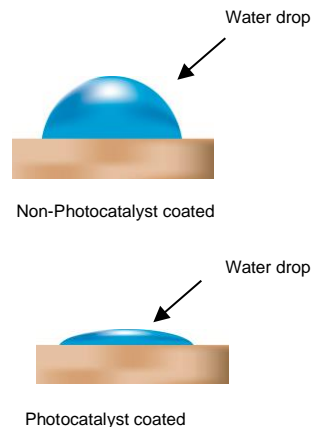


Figure-1

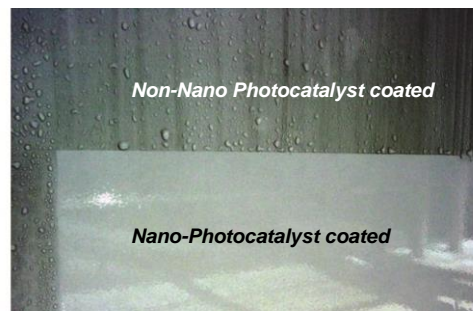
Difference between coated and non-coated surface

### Features of TiO<sub>2</sub> Photocatalyst

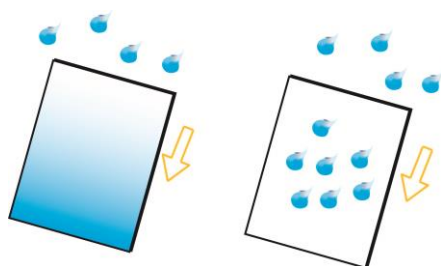
#### 1. Super Hydrophilicity

The photocatalyst coat will show the super hydrophilicity feature under light irradiation. The contact angle of the surface will be reduced to <10 degree, which brings 5 benefits of this feature.

- I. The water will not form a water drop on the surface when its contact angle is <10°, it will form a completely water film. The water will be in flat condition on the surface. This will help to reduce the water strain after rain wash.
- II. Generally, cleaning agent reduces the contact angle of water on surface. We call it hydrophilicity feature. TiPE nano coat's hydrophilicity will simulate this feature and provide better, and so that single water wash on the surface can reach the same effect to traditional washing with detergent. So after a rain wash, the surface will be renewed like after a traditional wash with cleaning agent.
- III. The hydrophilic feature can keep the water on the surface and the entire surface can be covered with only need a little water. This will prompt its transpiration. So if it is coated on a building wall, the building will need less energy to cool down in summer. If it is coated on a panel in the compressor of air condition, the air condition system will show better efficiency.
- IV. The dust in the air will be more difficult to absorbing on a super-hydrophilic surface.
- V. The hydrophilicity can make the surface with no water drop while raining, so it becomes cleaner in rain.



TiPE Nano Coat on Aluminum panel

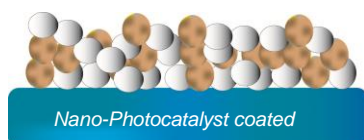


**Photocatalyst coated      Non-photocatalyst coated**

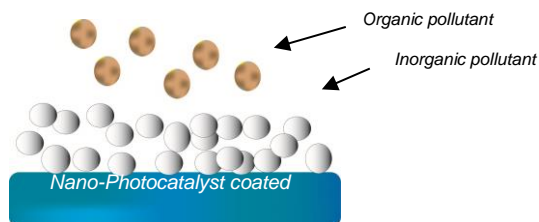
## 2. Organic Decomposition Feature.

When the coat is exposed to sunlight, it can decompose almost all the organic substance on the surface, which causes the following 2 benefits.

- i. When the coat decomposes the absorbed organic pollutant on the surface like oil, it will make the surface cleaner, and after the oil is decomposed, other inorganic pollutant will be unlikely to stay on the surface, and it can be easily washed down by rain or other cleaning method.
- ii. The coat can also purify the air around the building. Actually, the product is used to purify the NOx gas generated by the cars in somewhere. When the road side walls are coated, the surface will get clean and the environment around can be greatly improved as well.



(Organic and inorganic pollutants are strongly adsorbed on the surface of the wall which is coated with photocatalyst.)



(At the presence of light, the photocatalyst will decompose the organic pollutants. Without the adhesion of organic pollutant, the left inorganic pollutant on the surface can be easily swept away.)

## 3. Anti-bacterial and Anti-mold

There are 2 benefits of this feature.

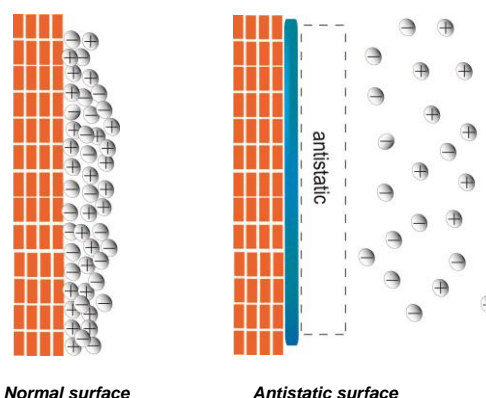
- i. The product can prevent mold or moss, so it will keep some marble and granite building cleaner.
- ii. The anti-bacterial will not only effect on the coat but also kill the bacteria in the air around, because of the air flow, the anti-bacterial feature will cause the bacterial in the besides air down.

## 4. Anti-UV Feature

The product can absorb some UV and protect the surface. The UV light may make some colored surface fade. The product can protect the surface from the UV damage.

## 5. Antistatic Feature

The antistatic feature can resist the static adsorption of the small dust such as ash, coal powder and etc.



### Tips: How to take advantage of the super-hydrophilic feature?

The super-hydrophilic feature can provide the same effect like detergent (reduce the contact angle of the surface).

**Self-cleaning:** If there is rain, the TIPE nano coat provide self-cleaning feature after rain wash. The rain wash have the same effect to your traditional wash on the surface with detergent.

**Easy-cleaning:** If there is no rain, you just need simply wash the surface using water. Your single water wash will also have the same effect to traditional wash with detergent.

To know more information about super-hydrophilic technology, please refer to the application manual of super-hydrophilic technology.

## Next Generation Building Cleaning Solution – TiPE Nano Coat

### Objective:

Building self cleaning, protection and energy saving

Road self-cleaning, protection and car exhausts purification



### Solution:

The TiPE nano photocatalyst coat is the combination of photocatalyst and nano technology. Just simply spraying the nano coat on the building exterior surface will bring diversified excellent features to the building.

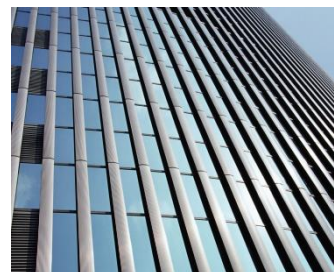
Also, the product can be sprayed on road and road side to provide the self-cleaning & air purification function to the road. The TiPE nano coat can keep the building or road in a very new view and reduce the cleaning & environment protection cost and water consumption.

### Features:

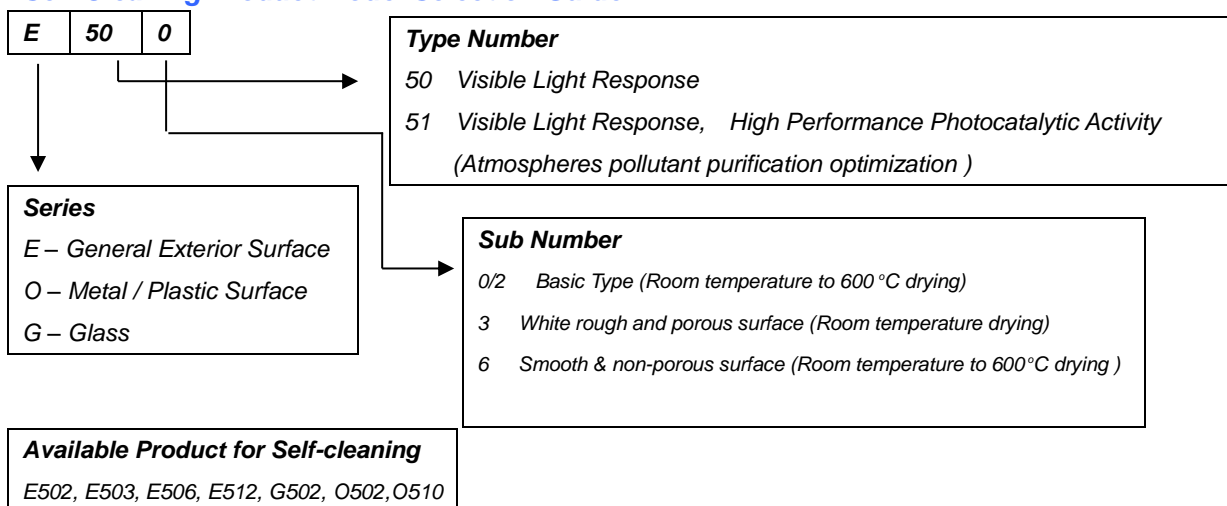
- ✓ Super hydrophilicity
- ✓ Organic pollutant decomposition
- ✓ Anti-bacterial and anti-mold
- ✓ Anti-UV protection
- ✓ Surface antistatic
- ✓ Self-cleaning
- ✓ Easy-cleaning

### Benefits:

- Keep the building in new and clean view
- Protect the surface from dust, acid rain and air pollutant damage
- Purify the air pollutant near and on the surface (e.g. car exhausts NOx, Formaldehyde, Benzene, VOCs)
- Decompose the organic pollutant on the surface (e.g. oil, graffiti)
- Make the surface without water stain after raining
- Reduce the energy consumption for cooling the building in summer
- Restrain mildew or alga growing
- Kill the bacteria and virus on the surface and in the air near the coated building
- Absorb the UV from sun and then protect the surface from UV damage
- Restrain the dust electrostatic adsorption



### Self-Cleaning Product Model Selection Guide



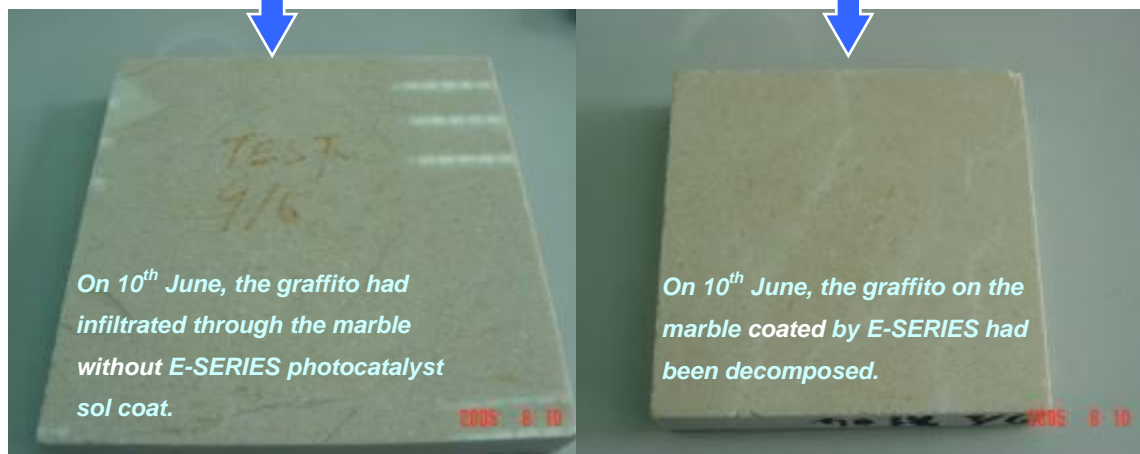
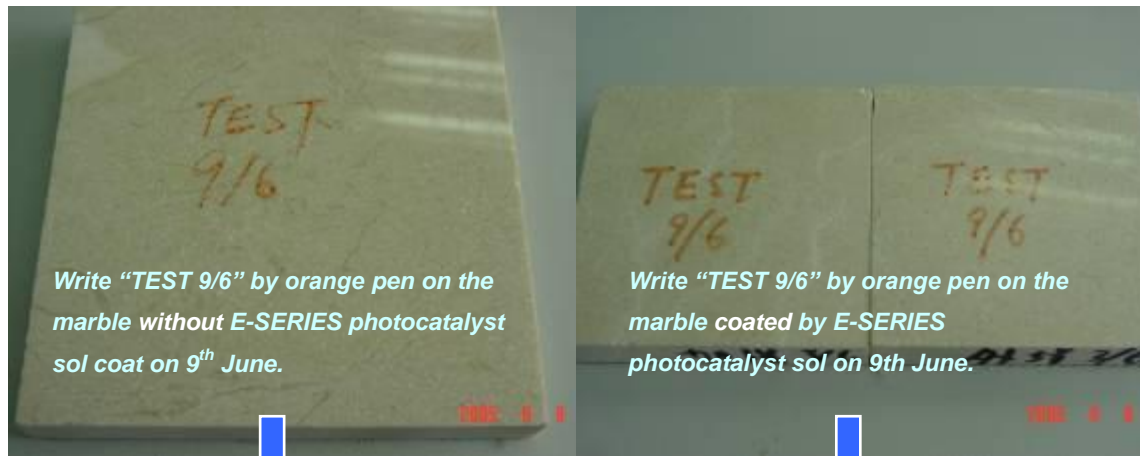
**Example.1** *Organic pollutant decomposition*

**Surface:** *Marble*

**Apply Method:** *Spray*

**Product:** *TiPE E-Series nano coat*

**Period:** *24 hours*







**Example.2** Exterior wall self-cleaning

**Surface:** Granite

**Product:** TIPE E-Series Nano coat



**Apply Method:** Spray

**Period:** 3 months

*This picture shows a granite wall which is old and dirty after years of weathering. The area divided by yellow adhesive tape is supposed to be coated with E-Series photocatalyst sol later.*

*(Photo #1 dated Dec. 14<sup>th</sup> 2005)*



*Before photocatalyst is coated on the surface, pre-cleaning work is necessary. Wash the granite wall and clean out the deposit stain and pollutant. If possible, cleaning the surface with suitable chemical solvent is recommended. Then spray E-Series on the left part of the cleaned area.*

*(Photo #2 dated Dec. 14<sup>th</sup> 2005)*



*After 3 months weathering, the wall coated with E-Series shows obvious self-cleaning function. The right part without photocatalyst becomes dirty and dark under the poor air condition of the metropolis. It will be close to the no cleaned area again after several months.*

*(Photo #3 dated Mar. 15<sup>th</sup> 2006)*



**Example.3** *Exterior column self-cleaning*

**Surface:** Granolith

**Product:** TiPE E-Series nano coat

**Apply Method:** Spray

**Period:** 102 days



*Day1: 40 years' old granolithic column had been cleaned with improper strong acidic cleaning agent. The structure of granolithic covering had been destroyed; air, dust & pollutants had been retained on column base after raining as photo 1 dated 2005-7-18. Lower part of the stained column base would be cleaned & treated with TiPE E-Series Nano Photocatalyst Coat.*

*(Photo #1 dated Jul. 18<sup>th</sup> 2005)*



*Day1: Lower part of column base (below the taped area) had been cleaned with cleansing agent. Dirt & stain had been removed off the stained area. Then E-Series was applied to the treated area of column base.*

*(Photo #2 dated Jul. 18<sup>th</sup> 2005)*



*Day 36: The untreated area- upper part of the column base was found dark & dirty while the area treated with E-Series, (lower part of the column) was found white & clean.*

*(Photo #3 dated Aug. 25<sup>th</sup> 2005)*



*Day 102: The untreated area became dark as a result of contamination by air & organic pollutants. Decomposition of pollutants & self-cleaning test on granolithic covering works & succeeds.*

*(Photo #4 dated Oct. 29<sup>th</sup> 2005)*



# TIPE

Nano technology in life.



**Example.4** *Exterior aluminum self-cleaning*

**Surface:** PVDF coated aluminum panel

**Apply Method:** Spray

**Product:** TiPE O502 nano coat

**Period:** 5 months



*This case is for a PVDF coated aluminum panel, it is new but easy to dirty. After wash by commercial cleaning agent and water, the left part was coated by TiPE O502 Nano Photocatalyst Coat. This photo is taken at 5 months after coating.*



*The above photo is treated by monochrome digital photo technology, it can show the dirty and difference between coated and non-coated part more clearly.*

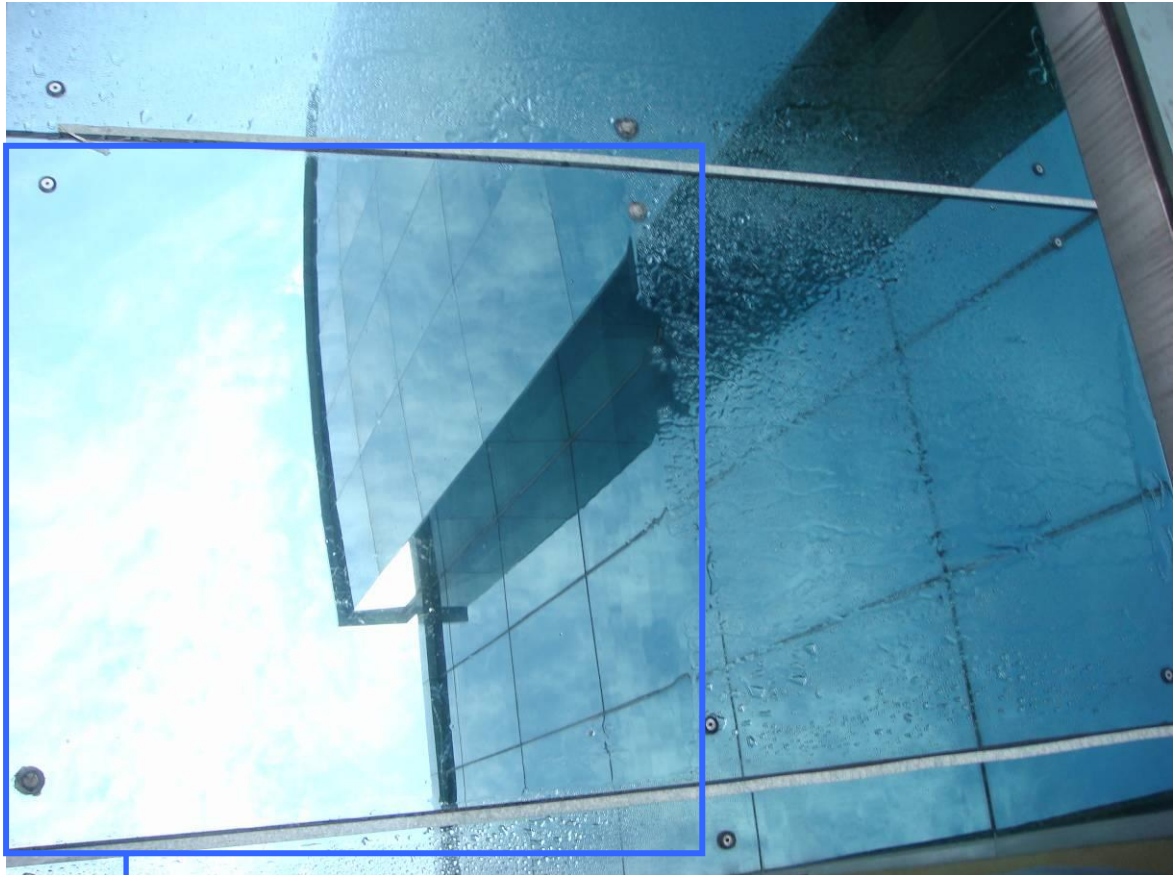


**Example.5** *Exterior glass self-cleaning & hydrophilic*

**Surface:** *Glass curtain facade*

**Product:** *TiPE O502 nano coat*

**Apply Method:** *Spray*



*The part with TiPE Nano Coat O502 show obviously hydrophilic feature, and have an excellent transparency appearance.*



***Suggested applications of super-hydrophilic technology***

Division	Function	Application
Materials for a road	Cleaning easiness	Tunnel lighting, Tunnel wall, Clear soundproof wall
	Self Cleaning by a rainfall	Traffic sign, Lightning, Soundproofed wall, Guardrail, Decorative laminated panel and Reflector on a road
	Anti-fogging property	Road mirror
Materials for a house	Cleaning easiness	Parts of a Kitchen, a Bathroom and Interior furnishings
	Self Cleaning by a rainfall	Exterior tiles, Siding boards, Window, Sash, Screen door, Gate door, Roof, Sun parlor, Handrail of a verandah
	Anti-fogging property	Mirror of a Bathroom and a Dresser
	Accelerated drying	Toilet, Window, Bathroom
Materials for a tall building	Self Cleaning by a rainfall	Window, Sash, Curtain wall, Painted steel plate, Aluminum panel, Tile, Building stone, Crystallized glass, Glass film
Materials for a store	Cleaning easiness	Showcase
	Self Cleaning by a rainfall	Signboard, Fingerpost, Show window, The exterior of a store
	Anti-fogging property	Refrigerated showcase
Materials for agriculture	Self Cleaning by a rainfall, Preventing dewdrops forming	Plastic and Glass greenhouse
Materials for an electric and electronic instrument	Cleaning easiness	Computer display
	Self Cleaning by a rainfall	Upper glass of a solar cell, Insulator
	Preventing dewdrops forming	Heat exchanger of an air conditioner, High-voltage cable
Materials for vehicles	Self Cleaning by a rainfall	Painting and Coating of vehicles, The outside of windows, Headlights
	Anti-fogging property	The inside of windows, Glass film, Helmet visor
	Preventing dewdrops forming	Side view mirror, Rearview mirror and Windshield of a motorcycle, Side mirror film
Materials for optical instrument	Anti-fogging property	Optical lens
Materials for medical instruments and supplies	Bio-compatibility	Contact lens, Catheter
Daily necessities and Consumer products	Cleaning easiness	Tableware, Kitchenware
	Self Cleaning by a rainfall	Spray of anti-fouling coat
	Anti-fogging property	Spray of anti-fogging coat, Anti-fogging film
Paint	All properties mentioned above	Paint, Coat