

What is Titanium Dioxide Photocatalyst ?

Titanium Dioxide is one of the basic materials in everyday life. It has been widely used as white pigment in paints, cosmetics and foodstuffs. When nano sized Titanium Dioxide is exposed to UV or visible light in the presence of water vapor, two highly reactive substances are formed: hydroxyl radicals [OH] and a superoxide ion [O<sub>2</sub>-1]. These are highly reactive chemical species can decompose volatile organic compounds, odor, formaldehyde, bacteria into harmless substance like Carbon Dioxide and water.



Principle:

Exposure to light energy

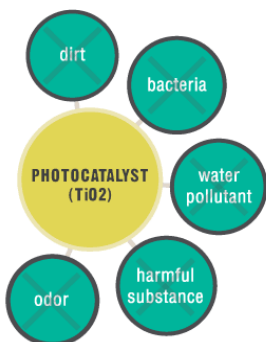
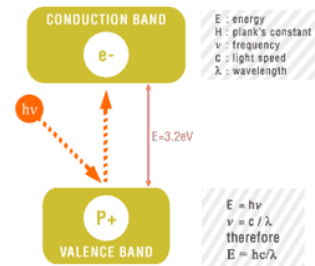
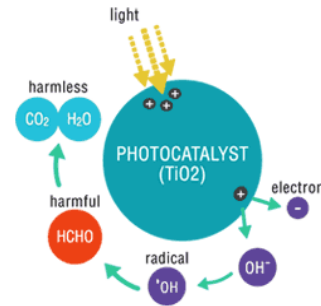
When a photon (light) with an suitable energy excites an electron (e<sup>-</sup>) from the valence band to the conduction band and leaving a positive hole (h<sup>+</sup>) behind.

OH radical appearance

The positive holes have the strong oxidation power and can react in an one-electron oxidation step with water to produce the highly reactive hydroxyl radical (·OH). Both the holes and the hydroxyl radicals are very powerful oxidants, which can be used to oxidize most organic contaminants.

Decomposition of organic compound

hydroxyl radical (·OH) takes the electron by the strong oxidation from the nearby organic compound to become stable oneself. In this way the organic compound is decomposed by loss of the electron and finally becomes carbon dioxide and water



Primary 5 Utilization

NOx Decomposition

Removal of harmful substance such as NO<sub>x</sub> and SO<sub>x</sub>, TVOC, formaldehyde in the atmosphere.

Deodorization

Adsorption and decomposition of odor such as acetaldehyde, ammonia, hydrogen sulfide.

Water treatment

Decomposition and removal of the volatility organic chlorine compound such as tetrachloroethylene and trichloroethylene that are the pollutant in the water.

Anti-Bacteria

Clean environment by the anti- bacteria and sterilization actions.

Dirtiness Prevention

Dirtiness prevention on curtain wall and window facade.

- 1/. 去除空氣中各種有害物質
- 2/. 去除異味
- 3/. 去除水中污染物
- 4/. 物仲長時間表面抗菌
- 5/. 物仲長時間表面抗污

ITP Products: / ITP 產品

### Visible light activate TiO<sub>2</sub> photocatalyst agent

Composition	1% TiO <sub>2</sub> , H <sub>2</sub> O
Appearance	Translucent or light milky (depending on model)
Crystal type	Anatase
Curing	Room temperature
Particle size	5 nm
pH	5 - 7
Odor	Odorless
Shelf life	1 to 3 years (depending on model)
Large areas application	offices, retail stores, hotels, casinos, museums, hospitals, clinics, laboratories, refrigeration systems, storage rooms, houses, apartments, corridors, toilets, vehicles compartment
Small areas application	artificial flowers, fluorescence tubes, gadget, cloths, watch, mobile, daily supplies



### UV light activate TiO<sub>2</sub> photocatalyst agent

Composition	100% TiO <sub>2</sub> after curing
Appearance	Yellow Translucent
Crystal type	Anatase
Curing	To be cured in oven for 1 hour at 500 °C
Particle size	5 nm
pH	7
Odor	Organic Solvent Smell
Shelf life	1 year
Application areas	Glasses, filters, ceramics, carriers, metal, fibers, UV tubes



ITP Services / ITP 服務

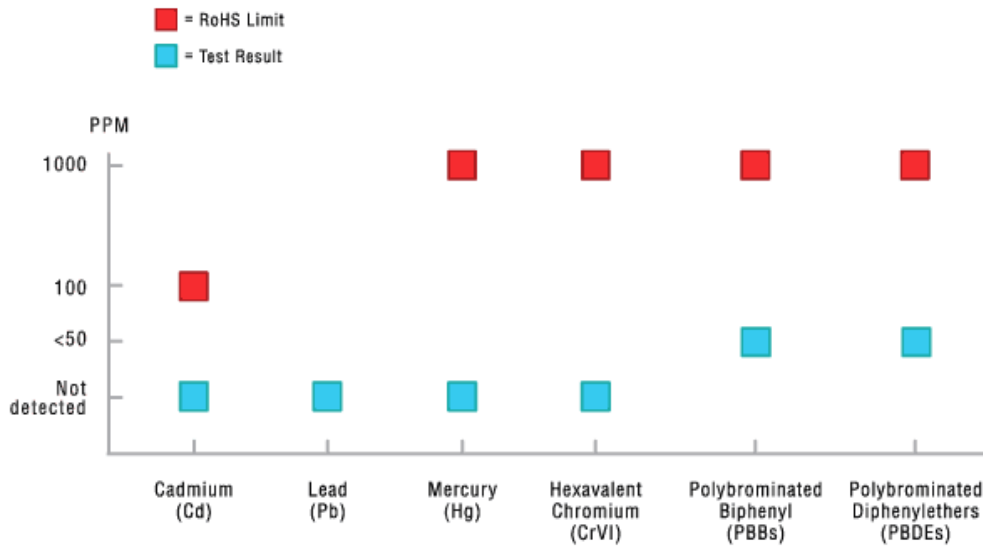
We provide coating services to customer for different purpose e.g. long term anti-bacterai, VOC & HCHO removal after decoration works and deodorize for bad smell in toilet etc... Effective period: 1 - 3 Years.

Customer has used ITP TiO<sub>2</sub> Coating in Hong Kong:

EMSD Airport & Vehicle Engineering Services  
Kai Shing Management Services Limited  
Hang Lung Properties  
Kiu Lok Service Management Co Ltd  
Central Management Limited  
Hysan Property Management Limited  
Standard Chartered Bank Property Management  
Marriott Properties (International) Ltd.  
BOC International  
Jones Lang Lasalle  
University of Hong Kong  
Hong Kong Oculoplastic Centre  
Hong Kong Eye Surgery Centre



## RoHS Directive 2002/95/EC Hazardous Substances Test

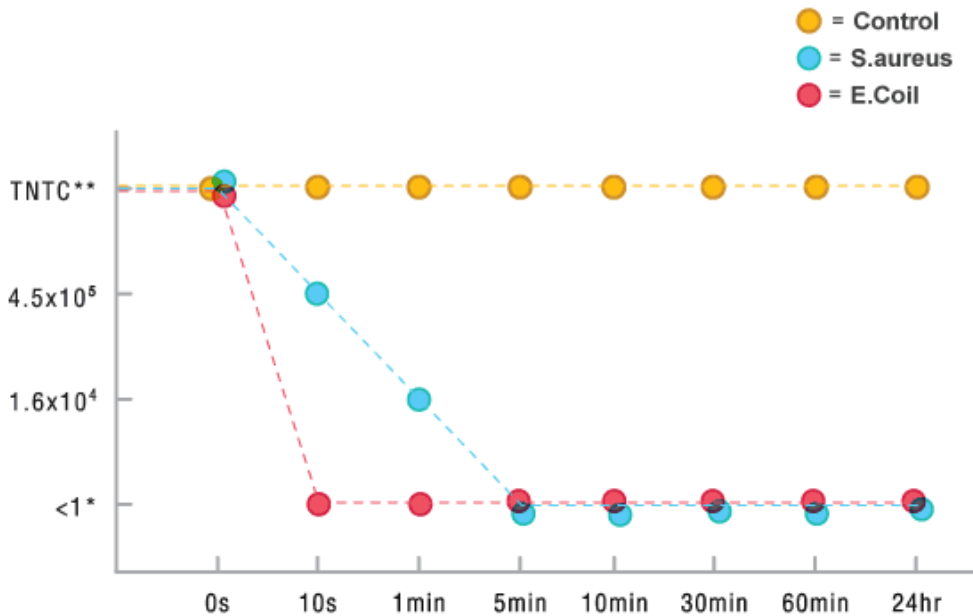


### E-coli & S. aureus Removal Test

#### Specimen preparation

- 20 ml ITP catalyst was inoculated with 0.1 ml bacteria culture (107 cells/ml)
- 20ml 0.85% saline was inoculated with 0.1mL bacteria culture as a control
- Place the ITP catalyst mixture in a light intensity of  $850 \pm 50$  lux
- Pipette 1ml of catalyst mixtures at the time interval of 10 seconds, 1 min, 5 min, 10 min, 30 min, 60 min and 24-hr for conducting standard plate count;
- The plates were incubated at  $35^{\circ}\text{C}$  for 48-hr;
- Plate count agar was used for the bacteria count.

#### Result



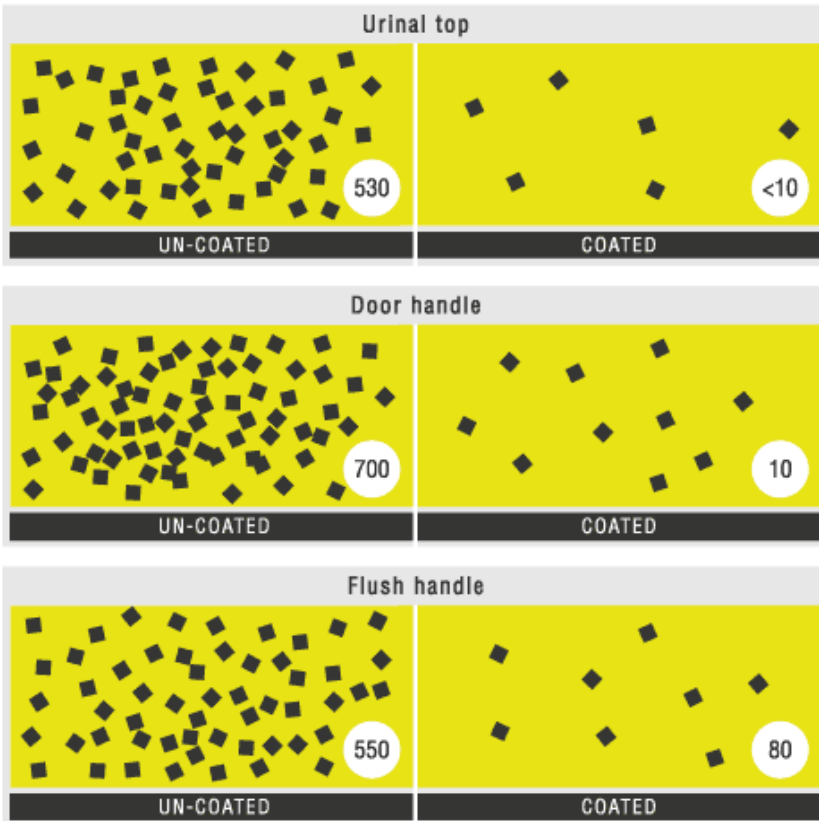
- \* Whenever there is no bacterium was detected on agar plate, the laboratory will report the result as less than one  
 \*\* TNTC = Too numerous to count

### Total Bacteria Surface Swab Test

#### Sampling procedure

- Pick up a sterile, non-cotton swab from the package
- Moisten the swab with sterile phosphate-buffered saline (PBS) solution
- Wipe the surface. The wipe area is 10cm X 10cm.
- Place the sampled swab in a sterile conical vial
- Submit the samples to the laboratory for analysis

## Total Bacteria Count : CFU/100cm<sup>2</sup>



### Formaldehyde Removal Test

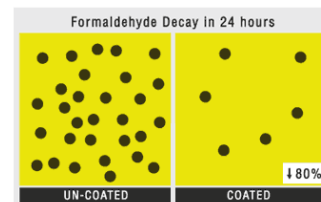
#### Specimen preparation

1. Dosage of 20g/m<sup>2</sup> ITP catalyst was used to spray coated on 6 pieces of 1m×1m card board specimen
2. 3 Specimens was put into a control chamber and 3 specimens were put into a test chamber. Each chamber is 1.5m<sup>3</sup> in volume
3. 40w fluorescent light was used in each chamber as light source
4. Fix amount of Formaldehyde was injected into each chamber
5. Measurements were taken after 24hr

#### Result

Formaldehyde concentration reduced from 2.62mg/m<sup>3</sup> to 0.55mg/m<sup>3</sup> in 24 hours.

The ITP catalyst reduced 80% of the formaldehyde in 24 hours.



### Decomposition of Methylene Blue

#### Specimen preparation

1. Dosage of 20g/m<sup>2</sup> ITP catalyst was used to spray coated on a wallpaper specimen
2. Dosage of 60ml/m<sup>2</sup> 10 ppm Methylene blue was coated onto the top of cured ITP catalyst surface

#### Measurement

1. Place the container under a fluorescent tube of 4000lux
2. Observe the color change after 12 hours

#### Result

Methylene Blue has been decomposed completely after 12 hours irradiation with fluorescent light.



### MSDS

Detail Material Safety Data Sheet are ready for customer to more understand about ITP TiO<sub>2</sub> material.

**Hong Kong Air Purifier Center Limited**

Tel: 852-34210167 Fax: 852-30054302