

## Project:

Self-Cleaning of glass surfaces

## Industry:

Glass Processing, Photovoltaics & Solar Heaters Protection

## Product:

Water Based nanotechnology suspension for Self-Cleaning and Anti-Fogging Glass

## Key Benefits:

- Direct Application without a heat treatment process
- Self Cleaning
- Antifogging
- Self Sterilizing
- Superhydrophilic
- Decomposes Odours
- Air purification
- Continuous Action
- Environmentally friendly cleaning technology
- Transparent coating
- Environmental restoration

## Applications:

- Self-Cleaning for windows and mirrors
- Protection from organic stains
- Prevents dust and mud formation
- Decomposes pollutants and protects the environment
- Bacterial & Fungal Growth Inhibition
- Exhaust Gas Break-Down

## Packaging:

10L and 30L canisters

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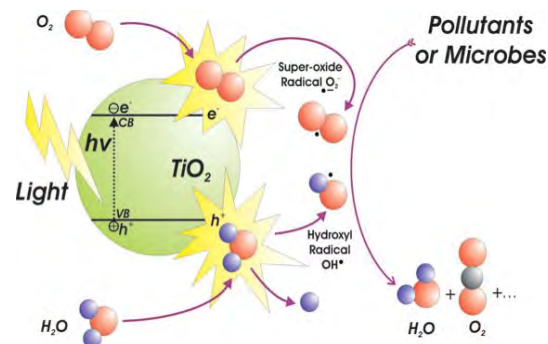
## SurfaShield® G

### Active Self-Cleaning Nanotechnology for the Protection of Glass Surfaces

SurfaShield G is a nanotechnology water-based suspension especially designed for glass surfaces, without the need of energy consuming heat treatment steps. Nanoparticles chemically bond on the treated surface and assure abrasion resistance. SurfaShield treated glass becomes superhydrophilic and antifogging, after minimal interaction with light. By harnessing the surrounding light (natural or artificial), modified glass surfaces become self-cleaning: They decompose organic material and deactivate any living microorganism. SurfaShield coated surfaces can efficiently eliminate organic stains, bacteria, fungi, gaseous pollutants, even odours. Most importantly, dirt cannot adhere on the glass surface and dust is easily washed away. Light dependant devices, such as photovoltaics and solar heaters maintain their original efficiency with the self-cleaning of their glass surfaces.



SurfaShield G coated glass. Light activates SurfaShield nanoparticles. Rain can easily wash the dirt away.



The activation mechanism of a SurfaShield G nanoparticle produces cleaning and sterilizing scavenging radicals that decompose pollutants or microbes.

SurfaShield® is a registered trademark of NanoPhos SA, PO Box 519, Science & Technology Park of Lavrio Lavrio 19500, Greece

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## What is the nature of the SurfaShield G coating?

SurfaShield is a water based formulation that consists of a unique mix of inorganic oxides with titanium dioxide being its main component. The final coating creates a purely inorganic nanostructure that bonds on the surface of existing materials without thermal treatment. SurfaShield combines material functionality and industrial applicability.

## How is SurfaShield G applied on glass surfaces?

HVLP (High Volume Low Pressure) spraying should be used as it combines both application simplicity and an ideal uniform functional coating. Two or three applications with a very thin layer are recommended. Follow the detailed application note, as described below. SurfaShield G is transparent, chemically inert and perfectly adheres on glass surfaces by chemically anchoring on the existing surface. Estimated consumption rate: 30-38 m<sup>2</sup>/L.

## How does it work?

SurfaShield G makes the glass surfaces superhydrophilic and antifogging. Due to their nano-size, SurfaShield G nanoparticles absorb the available surrounding light energy (natural or artificial) and a series of physical phenomena takes place. In particular, a rearrangement of the surface hydroxyl groups that are hydrophilic (water-loving) is realized. Thus they reduce surface tension and the coating exhibits a super-hydrophilic character: Humidity and water droplets cannot stand on the SurfaShield G coated surface and dirt, dust and pollutants get washed away. Persistent organic pollutants get decomposed by the self-cleaning properties that SurfaShield G also exhibits.

## What is the benefit for treated surfaces?

SurfaShield G transforms light energy in favor of cleanliness and quality of life. It is not consumed or altered. Glass surfaces are preserved as new without the need of hazardous chemicals; only water and light are necessary. The coating prevents pollutants and dust from sticking on the surface thus protecting it from stains and colorants. SurfaShield also works as an air purifier as it decomposes harmful organic substances such as volatile organic compounds (VOC) and car exhaust fumes and nitrogen oxides (NOx).

## SurfaShield G Tests

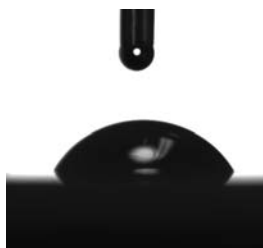
**Contact angle:** <4° (superhydrophilic)

**Antibacterial test :** 88.6% of bacterial colony reduction within 4 hours

**Antifungal test :** 81.3% of fungal colony reduction within 4 hours

**Photocatalytic Activity (Methyl Orange Test) Rate:** 6.5 x 10<sup>-5</sup> min<sup>-1</sup>

Untreated  
Glass



SurfaShield G  
Superhydrophilic  
glass



### Application Note

Shake or stir the container before use. Prior to application clean the surface with water or a solvent using a cloth. The application surface should be dry and clean. Apply SurfaShield G by HVLP (tip diameter 0,8mm) spraying. Two or three applications of a very thin layer are recommended. Between each application let the material dry (up to 10 minutes strongly dependent on ambient temperature). Do not apply excessive amounts of the material on the glass surface (do not allow dripping). Total consumption rate of 30-38 m<sup>2</sup>/L is recommended. After the application let the material to cure on the surface without wetting or touching it. Only water is necessary for the cleaning of the coated surface.

### Physical Properties

Milky white, Water Suspension with slight odour and pH = 9-9.5.

Boiling & Flash Point: 41°C

Density: 0.98 g·cm<sup>-3</sup> Viscosity: 1.5 cP

SurfaShield G is not considered an oxidant.

### Safety & Storage

SurfaShield G contains no dangerous ingredients and it is water based. VOC Content: 136 g/L (EU limit "One-pack performance coatings", Type WB (2010): 140g/L). Not hazardous according to Council Directive 1999/45/EC and its subsequent amendments. Request, read and comprehend the SDS. Avoid freezing. Expiration Date: 18 months after the production date.



## What is Nanotechnology?

Nanotechnology refers to the scientific field, which deals with very small structures, usually sized below 100 nm. One nanometer (nm) is one billionth of a meter (10<sup>-9</sup> m) - it is so small that if earth were one meter in diameter, then one nanometer would have been the size of an apple! Nanosized materials reveal unique properties when compared to ordinary, bulk materials or even molecules.

## NanoPhos at a Glance...

At NanoPhos, we take advantage of the unique properties of nanotechnology and invent clever materials that solve every day problems. By harnessing nanotechnology, we seek to create a more comfortable, safe and trouble-free living environment. We transfer innovations out of our lab into the hands of consumers. Our vision is clear: "Tune the nanoworld to serve the macroworld" - in simple terms we make nanoparticles solve common problems. NanoPhos was recognized in January of 2008 by Bill Gates as one of the most innovative companies and also received the 1<sup>st</sup> prize for innovation at the prestigious 100% Detail Show in London. NanoPhos is a rapidly growing company that is actively expanding its distribution network. Currently, the company is present in the UK, Ireland, Norway, Sweden, Finland, Denmark, Portugal, Italy, Greece, Cyprus, Japan, K. of Saudi Arabia, K. of Bahrain, China, New Zealand, Australia and Mexico.

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NanoPhos SA has been approved by Lloyd's Register Quality Assurance to follow the EN ISO 9001:2008 Quality Management System and EN ISO 14001:2004 Environmental Management System for the production and sales of chemical products for cleaning and protection of surfaces and nanotechnology products.

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