Project:

Self cleaning and antifogging coating of photocatalytic technology for glass surfaces

Product:

Water-Based nanotechnology titania suspension applied by spraying

Key benefits:

- Self-cleaning by absorbing sunlight
- Antistatic - Prevents dust accumulation
- Antifogging - superhyrdophilic
- Increases glass transparency
- Prevents slime and dirt accumulation
- Binds chemically exhibiting advanced lifetime

Applications:

- Efficiency improvement of photovoltaics (PV)
- Efficiency improvement of solar heaters
- Reduces the frequency of cleaning and maintenance

Packaging:

Canisters of 10L and 30L

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SurfaShield® G

Active Self-Cleaning Nanotechnology for the Maintenance of Highly Transparent Glass Surfaces

SurfaShield G is an invisible coating based on nanostructured titanium dioxide, which after application on the glass surface exhibits a remarkable property: it absorbs surrounding light (ultraviolet) and transforms it to chemical energy decomposing any pollutant that touches the glass surface. Thus, glass surfaces become self-cleaning without negatively affecting substrate's transparency, meaning that the transparency is increased as nanoparticles reduce the local roughness of glass that would reflect light. Additionally, SurfaShield G acts as an antistatic preventing sand and dust accumulation. The action of the coating is enhanced by antifogging properties: Water cannot form droplets that scatter light and the fogging effect is prevented in high humidity/low temperature conditions.

Glass window treated externally with SurfaShield G

Glass window without treatment

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NanoPhos
Pioneering Nanotechnology

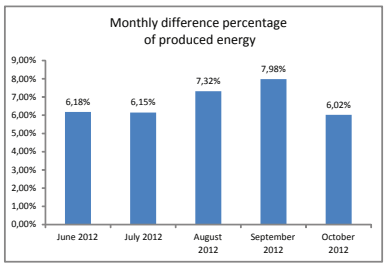
Which are the benefits for photovoltaics (PV) systems?

The application of SurfaShield G on photovoltaics increases the efficiency about 2% just after application. This is due to the transparency increase of protective PV panel glass: the coating reduces the surface roughness allowing more energy to reach the solar cell. Additionally, an increase of 3-7% is achieved as the glass surface remains cleaner, without particles, dust or stains that affect negatively the PV efficiency.

How SurfaShield G is applied?

SurfaShield G application is realized by Tornador of Bendel GmbH. The application requires a portable air compressor. The appplication should be realized by specialized technicians to avoid optical coating defects. It has been measured that the time needed for the application is 2 minutes for every surface square meter. The total consumption rate of the product is 30 m^2/L.

Portable PV panel adter 6 months of exposure to natural environment. The difference of right module (untreated) with the other two (SurfaShield G treated) is obvious.



Comparison of total produced energy between an untreated PV module and SurfaShield G treated during 2012.

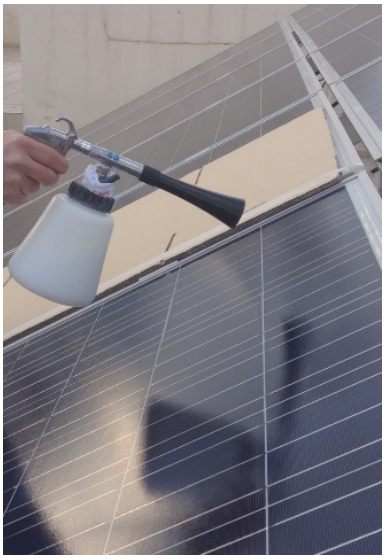
How the effect of SurfaShield G on PVs was studied?

The study of SurfaShield G coating effect was realized by the National Technical University of Athens (NTUA) at the Technology Park of Lavrio with 24 hour recording of PV parameters and environmental conditions. It was proven that during the period of June to October of 2012 the total produced energy was enhanced by 7% compared to a PV system without SurfaShield G coating.

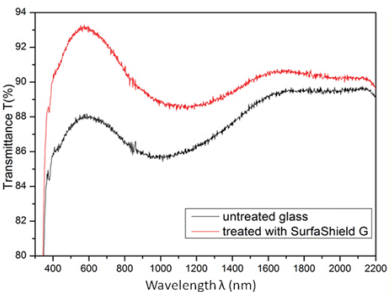
Economotechnical study for SurfaShield G

According to the product's consumption rate, materials and application costs and the increase of produced energy it is calculated that the depreciation time is less than 6 months! The extra produced energy after this time period will be translated to profit. The energy benefit can balance potential interests of financing or similar losses.

The coating lifetime will not outreach 10 years but there is no need to periodic maintenance. The action of the coating is continuous under sunlight irradiation: the photocatalytic activity of nanostructured titania ensures that active ingredients are not consumed during function.



SurfaShield G application with Tornador applicator of Bendel.



Glass transparency spectrum before (black) and after (red) SurfaShield G application.

Physical Properties

White, Water based suspension with pH = 9.2±0.5. Contains less than 10%w/w isopropanol. Flash Point (closed cup method): 41°C Density: 0.98±0,05 $g \cdot cm^{-3}$ Viscosity: 2 mPa·s, VOC content: 136 g/L SurfaShield G is not an oxidant.

Safety & Storage

Highly flammable liquid and vapour. Causes serious eye irritation. Keep away from heat / sparks / open flames / hot surfaces. No smoking. Keep container tightly closed. Wear protective gloves / protective clothing / eye protection / face protection. IF ON SKIN (or hair): Remove / Take off immediately all contaminated clothing. Rinse skin with water / shower. If eye irritation persists: Get medical advice / attention. Avoid breathing dust / fume / gas / mist / vapours / spray. Use only outdoors or in a well-ventilated area.

What is Nanotechnology?

Nanotechnology refers to the scientific field, which deals with the research and creation of small matter particles, usually sized below 100 nm. One nanometer (nm) is one billionth of a meter (10^{-9} 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 and into the hands of consumers. Our vision is clear: "Tune the nanoworld to serve the macroworld" – in simple terms we make nanoparticles to solve common problems. NanoPhos was recognized in January 2008 by Bill Gates as one of the most innovative companies and also received the 1st 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, Norway, Sweden, Denmark, Portugal, Spain, France, Italy, Greece, Cyprus, Egypt, Sudan, Saudi Arabia, Bahrain, UAE, Qatar, Oman, Iran, India, New Zealand, China, Japan, Mexico, Guatemala, Thailand, Malaysia and Singapore.

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NanoPhos SA has been approved by Lloyd's Register Quality Assurance to follow the EN ISO 9001:2000 Quality Management System and the environmental management system EN ISO 14001:2004 for the development, production and sales of chemical products for cleaning and protection of surfaces and nanotechnology products. Furthermore, it is certified for occupational health and safety management systems with OHSAS 18001:2007.

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