THE FUTURE OF ANTI-CORROSION COATING

NANOXY
We offer specific solutions and products based on your project.
Contact us!

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www.nanoxycoatings.com
info@nanotrading.ltd
<table>
<thead>
<tr>
<th>CONTENTS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ABOUT US</td>
<td>p.2</td>
</tr>
<tr>
<td>NANOXY</td>
<td>p.3</td>
</tr>
<tr>
<td>WHERE &amp; HOW TO APPLY NANOXY</td>
<td>p.4</td>
</tr>
<tr>
<td>ADVANTAGES</td>
<td>p.5</td>
</tr>
<tr>
<td>SPECIFICATIONS</td>
<td>p.7</td>
</tr>
<tr>
<td>LAB TESTS</td>
<td>p.8</td>
</tr>
<tr>
<td>PRODUCT LIST</td>
<td>p.10</td>
</tr>
<tr>
<td>CERTIFICATIONS</td>
<td>p.11</td>
</tr>
<tr>
<td>APPLICATIONS</td>
<td>p.13</td>
</tr>
<tr>
<td>CASE STUDIES</td>
<td>p.14</td>
</tr>
</tbody>
</table>
XI’AN HUAJIE OKHAI NEW MATERIAL CO., LTD.

Xi’an Huajie Okhai New Material Co., Ltd., was established in China in 2009 with the mission of using nanotechnology to provide innovative anti-corrosion solutions. With a strong R&D team and a state of the art production site, the company offers a wide range of heavy-duty anti-corrosion coatings for a multitude of industries.

NANO TRADING

Nano Trading is the exclusive distributor of NANOXY products and your partner in fighting industrial corrosion.

Helping to reduce your maintenance costs while meeting or exceeding your standards for corrosion management. We work closely with you in ensuring that you receive the best product for your specific project and guarantee it will meet regulations.

We offer specific solutions and products based on your project.
TO COMBAT THE EXORBITANT ANNUAL COST OF CORROSION AND OFFER DURABLE PRODUCTS, THE COMPANY HAS DEVELOPED UNIQUE FORMULAS:

NANOXY OFFERS A WIDE RANGE OF REVOLUTIONARY HEAVY-DUTY ANTI-CORROSION COATINGS MADE OF NANOFIBER POWDER AND EPOXY RESIN.

The particle diameter is between 40-80nm, with a length of 2-3μm and a conductivity of 13s/m. The binary nanoparticle structure creates an invisible protective film on the metal surface. When in contact with water or saline solution, the interface allows the metal anode to enter passivation potential, forming a dense oxide passivation layer with corrosion resistance. It can increase the corrosion potential to 223mV, reducing the corrosion current density to 173.2μA / cm², forming a dense conductive network structure, on the metal surface. NANOXY has reversible redox properties, without any material loss, therefore the theoretical corrosion resistance period can be as long as 50 years.

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WHERE & HOW TO APPLY NANOXY

NANOXY OFFERS ANODIC PROTECTION WITHOUT AN ELECTRIC CHARGE FOR NUMEROUS MATERIALS:

NANOXY can be easily applied to these materials, either by spraying, brushing, roller coating, squeezing or dipping.

STAINLESS & CARBON STEEL

ALUMINUM ALLOY

CONCRETE

ACID-RESISTANT BRICK

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ADVANTAGES

THANKS TO ITS UNIQUE COMPOSITION, NANOXY OFFERS MANY ADVANTAGES:

- High adhesion which diminishes the time spent on treating a surface
- Low permeability: $3.6 \times 10^{-5}$ (mg/ [ cm ] $^2\times$ d)
- High viscosity: no particles and better atomization for a loss rate below 20%
- High resistant to scratching or chipping, it also has the capacity to self repair
- FDA approved (for all other certifications, see page 8)
- Environmentally friendly (no heavy metals)
- Density close to water
- Replaces high pollution galvanization and oxidation processing
- Antibiosis material

NANOXY’S MOST IMPACTFUL ASSET IS ITS INCREDIBLE LONGEVITY

THE MANUFACTURER CONFIDENTLY OFFERS WARRANTY FOR UP TO 50 YEARS!

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NANOXY CAN HELP YOU SAVE TIME & MONEY

2/3 LIGHTER THAN ORDINARY PAINT*

33% CHEAPER THAN TITANIUM ALLOY

SURFACE PROCESS COST 4X CHEAPER

6X FASTER TO APPLY THAN FIBERGLASS

IT IS ALSO ULTRA-RESISTANT IN:

ACIDIC, ALKALINE AND SALINE ENVIRONMENTS

*considerably reduces total weight when applied on a wide surface

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<table>
<thead>
<tr>
<th>TEST</th>
<th>DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salt-spray Test</td>
<td>No change in 10 000h</td>
</tr>
<tr>
<td>In Acid (10% H$_2$SO$_4$)</td>
<td>No change in 10 000h</td>
</tr>
<tr>
<td>In Alkali (10% NaOH)</td>
<td>No change in 10 000h</td>
</tr>
<tr>
<td>In Salt Water (10%NaCl)</td>
<td>No change in 30 000h</td>
</tr>
<tr>
<td>In Gasoline 93 (RON)</td>
<td>No change in 30 000h</td>
</tr>
<tr>
<td>Permeability for Cl-</td>
<td>$3.6 \times 10^{-5} / \text{mg(cm}^2\times\text{d)}$</td>
</tr>
<tr>
<td>Adhesion</td>
<td>22MPa for carbon steel, 12MPa for stainless steel / aluminum alloy</td>
</tr>
<tr>
<td>Surface energy</td>
<td>10~15 mJ/m$^2$</td>
</tr>
<tr>
<td>Abrasion Resistance</td>
<td>4.8mg (500g/1000r)</td>
</tr>
<tr>
<td>Working Temperature Range</td>
<td>-50°C~360°C</td>
</tr>
<tr>
<td>Artificial accelerated aging</td>
<td>7 000h</td>
</tr>
<tr>
<td>VOC</td>
<td>&lt; 385g/L (FDA) No Zinc or Heavy Metal</td>
</tr>
<tr>
<td>Coated Film Thickness</td>
<td>60 to 300 µm / 2.4 to 11.8 mils (depending on the product)</td>
</tr>
<tr>
<td>Theoretical spreading rate</td>
<td>1.6 to 7.3 m$^2$/kg / 7.8 to 35.6 sqf/lb (depending on the product)</td>
</tr>
</tbody>
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LAB TESTS

The addition of nanofibers to the epoxy resin facilitates the formation of a passive layer to prevent electrochemical reactions from occurring.

Thanks to the ultra-small nanofiber structure and unique reversible redox behaviour, NANOXY has strong adherence to the surface and impermeable properties. The smooth structure allows our coatings to penetrate and ensure efficient anodic protection.

NANOXY’s adhesion performance

All the squeezing, punching and scratching were made AFTER the plate was coated.

<table>
<thead>
<tr>
<th>10% H2SO4</th>
<th>5% NaOH</th>
</tr>
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<tbody>
<tr>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
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</tbody>
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The two NANOXY-coated plates have been soaked for 10,000 hours. The scratches were carved before the test.

NANOXY has also been tested in:
- acid (98%H2SO4) for 930 days
- coal tar for 150 days
- light crude oil for 100 days

Each test shows that NANOXY is protecting the metal surface from harsh environments.

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Regular anti-corrosion coating in acid for 4 days.

Regular anti-corrosion coating in acid for 7 days.

Coated with NANOXY. After 30 days in acid, the topcoat is still bright and shiny.

Acidic environment (12%HF+2.5%HCl) on STAINLESS STEEL
PRODUCT LIST

GENERAL ANTI-CORROSION PRODUCTS
Primer / Topcoat / Paint Thiner
mild & harsh environments

TANK PRODUCTS
Primer / Topcoat / Potential Adjustment Coat
oil, LNG, acid & alkali tanks

BRICK & CONCRETE STRUCTURE PRODUCTS
Primer / Topcoat / Potential Adjustment Coat / Interface Agent Coat
brick & concrete structure, steel desulfurization chimney, non-radioactive area in nuclear plants

VESSEL & CONTAINER PRODUCTS
Primer / Topcoat
FRP hull surface, offshore ship hull & deck, container interior & exterior

MARINE FACILITY PRODUCTS
Primer / Topcoat / Potential Adjustment Coat
desalination equipment interior & exterior, oil drilling platform, marine facility steel structure

INFRASTRUCTURE PRODUCTS
Primer / Topcoat
railway, bridge, highway under mild & harsh environments

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NANOXY’s manufacturer is focusing on **solving the corrosion problems** that our industries are facing. To support their vision, they have put environmental and quality systems in place to follow **INTERNATIONAL CERTIFICATION STANDARDS**

**RoHS**

*Restriction of Hazardous Substances, also known as Directive 2002/95/EC,* bans the use of the following substances: lead (Pb), mercury (Hg), cadmium (Cd), hexavalent chromium (CrVI), polybrominated biphenyls (PBB), polybrominated diphenyl ethers (PBDE), and four different phthalates (DEHP, BBP, BBP, DIBP). **NANOXY** successfully got approved in 2015.

**FDA**

*FDA Food Grade 21 CFR 175.300:* “Resinous and polymeric coatings may be safely used as the food-contact surface of articles intended for use in producing, manufacturing, packing, processing, preparing, treating, packaging, transporting, or holding food”.

**ISO 14000**

This standard provides practical tools to manage environmental responsibilities. It includes specific approaches such as audits, communications, labeling and life cycle analysis, as well as environmental challenges such as climate change.
ISO 9000
This standard is based on a number of quality management principles, including a strong customer focus, the motivation and implication of top management, the process approach and continual improvement. It provides guidance and tools to ensure that products and services meet customer’s requirements, and that quality is consistently improved.

CCS
NANOXY obtained the CCS Marine Coating certification. Therefore, the quality of marine coating is guaranteed to comply with the related conventions, regulations, rules and standards and a prerequisite is in place for safeguarding the quality of ships and the safety of life at sea.

OHSAS
OHSAS 18000: International standards relating to occupational health and safety management. It ensures:

- The adoption of international best practice in relation to risk management
- Health and well-being of employees, sub-contractors and the public
- Legislative awareness and compliance

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APPLICATIONS

PETROCHEMICAL FACILITIES
- Oil drilling platforms
- Offshore facilities
- Pipelines
- Storage tanks
- Desulfurization & Denitrification Towers

ENVIRONMENTAL PROTECTION
- Desalination facilities
- Water treatment facilities

INFRASTRUCTURE & CONSTRUCTION
- Bridges & Buildings
- Highway fences
- Equipment
- Lamp posts

MARINE EQUIPMENT
- Ships / vessels
- Containers
- Ports

TRANSPORTATION
- Airplanes / Airport
- Trains
- Railways facilities
- Cars
- Road signs

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Severe pitting corrosion problems occurred in Purified Terephthalic Acid (PTA) production plants. The reaction catalyst contains bromide, which acts as the oxidation initiator, while cobalt and manganese ions act as the propagators of oxidation.

In 2016, BP, a multinational energy company, decided to find a better anti-corrosion solution for its PTA plants in China. Previously they relied mostly on high-performance corrosion-resistant metal materials, however that didn’t actually solve their ever-increasing corrosion problems. They selected 5 potential anti-corrosion suppliers for testing, including NANOXY.

BP’s global scientists designed the test program, and asked a third-party institution - Nanjing University, for corrosion resistance and destructive testing. Final results indicated that NANOXY’s performance outmatched its competitors, as it was the only coating that survived the harsh testing environments intact.
OTHER COMPANIES HAVE ALSO TRUSTED NANOXY TO HELP THEM FIGHT CORROSION DURING THEIR DESULFURIZATION PROCESS:

Qingdao Shunan Thermal Power’s steel chimneys have a C5-I environment (very high corrosivity according to ISO 12944) but NANOXY solved their corrosion problems. Thanks to its superior adhesion, temperature variable scalability and its resistance under an acidic environment.

NANOXY Tangshan Sanyou Thermoelectric used internal vitrified brick masonry as its anti-corrosion method (with their desulfurization chimney) and noticed leakage after six months. After which they underwent an obligatory renovation in 2014, where they successfully applied NANOXY and haven’t had corrosion problems since.

The Datong No.2 power plants desulfurization chimneys anti-corrosion renovation project was successfully completed with NANOXY as well, offering a lifespan of more than 10 years.
Fluid Catalytic Cracking (FCC) is one of the most common techniques used to transform crude oils into more valuable gasoline, olefinic gases and other products.

The exhaust from the emissions contains sulfur dioxide and nitrogen, both of which need to be removed. That’s where the desulfurization and denitrification processes intervene. However, these processes create massive corrosion problems. In the middle of the desulfurization tower, just above the liquid inlet, gas corrosion appears; below it, liquid corrosion is encountered. NANOXY is capable of tackling corrosion from both liquid and gas.

Sinopec has been using polyuria and other materials to reduce corrosion in its desulfurization and denitrification tower. But it has to be replaced every 3 months or so, because the damages to the anti-corrosion layers are too serious. That’s why Sinopec decided to use our FS300 Nano-Desulfurization Special Primer and FD300 Nano Potential-Adjustment Coating to solve their corrosion problems. The use of NANOXY by Sinopec establishes a new industry solution in desulfurization & denitrification towers, extending their lifespan and reducing maintenance costs.
NANOXY IS WELL SUITED FOR MARINE EQUIPMENT THANKS TO ITS HIGH RESISTANCE UNDER SALINE ENVIRONMENTS

An ocean vessels anti-corrosion coating must have good resistance to seawater and salt spray corrosion. In most cases, companies use zinc-rich paints.

Zinc-rich paint was invented in the 1960s. To some degree, it has become synonymous with anti-rust and anti-corrosion. Because they can significantly affect aquatic environments, zinc-rich coatings have almost reached their performance limit.

NANOXY, with its electric charge-free anodic protection, high resistance under saline environment, food-grade environmentally friendly composition, adhesion up to 22Mpa and chloride ion permeability up to $3.6 \times 10^{-5}/\text{mg/cm}^2 \cdot \text{d}$, meets the demands for better anti-corrosion solutions for marine equipment.

China National Offshore Oil Company and Guangdong Shangchuan Island FRP cruise have both used NANOXY for their vessels and welcomed the technology with great enthusiasm.
STORAGE TANKS

Once a large storage tank is constructed, it is difficult to carry out the internal anti-corrosion renovation. Therefore, the quality of anti-corrosion materials will be directly related to the lifespan and safety of the tank and will impact community safety and personal health.

As crude oil has a strong corrosive power, companies use asphalt soaking as an internal and external anti-corrosion treatment. The lifespan of this technique is about 1 to 2 years. This traditional anti-corrosion method not only causes environmental pollution, but also increases maintenance costs.

Strong corrosive liquids, such as sodium hypochlorite, nitric acid, hydrochloric acid, sulfuric acid, ammonia, and caustic soda, are highly corrosive to containers and are high risk for long-term storage. Often, companies need to purchase precious metal storage tanks; glass fiber reinforced plastic for lining and proceed with regular inspections and maintenance to avoid potentially dangerous situations.

Whether you’re storing crude oil, strong corrosive liquids or LNG products, NANOXY offers specialized coatings for each industry’s needs. Many companies have already trusted NANOXY for their projects:

YANCHANG OILFIELD AND CHANGQING OILFIELD (BURIED CRUDE OIL TANKS)

LNG5000M3 TANK OF ELION GROUP

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