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NANOTECH FOR NEWBIES

HYDROPHOBICITY +
ANTI-CORROSION
NANOCOATINGS

HERE'S THE THING ...

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AN UNIMAGINABLY

Tiny Science

- Nano= Greek: 'Dwarf'.
- 1nm = 0.000001mm [70,000 times thinner than human hair]
- Nothing new! Started by Richard Feynman 1959. Lift-off 1981
- **'Nanotechnology' coined by Norio Taniguchi in 1974**
- Inspired by nature: Lotus plant, gecko, peacock feathers, etc.
- Several Nobel Prizes awarded



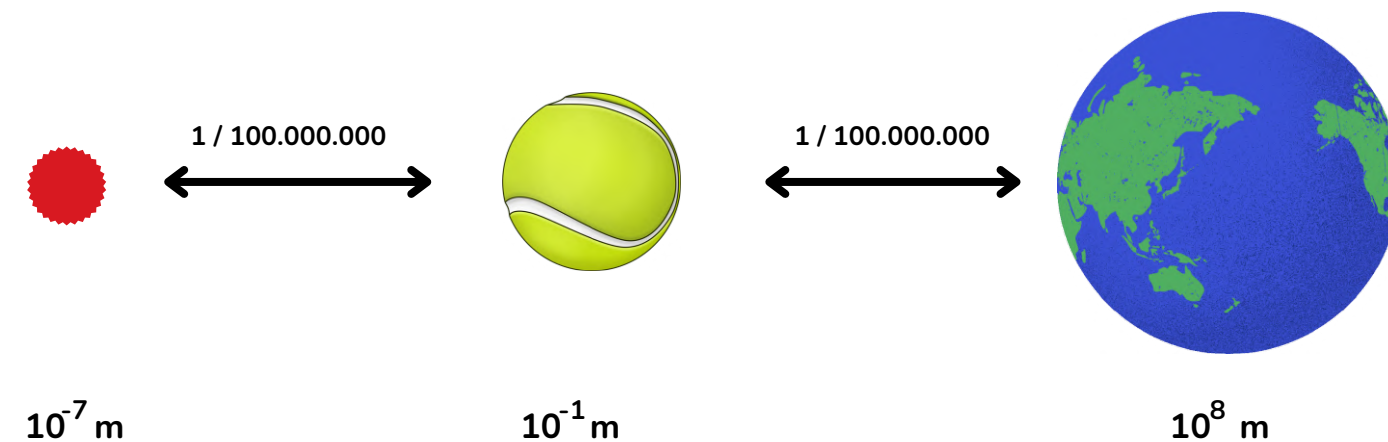
AN EXRTA-ORDINARY

Engineering Achievement

- **All about purposeful manipulation of surface properties**
- The nano world behaves differently to the world we see with our eyes
- A key future technologies with unimaginable potential!
- Tiny quantities can have a huge and long desired impact on substrate
- Significant inventions past 15 years
- Accepted safe technology across nearly any sector
- Used today EXTENSIVELY + QUIETLY in nearly every industry today

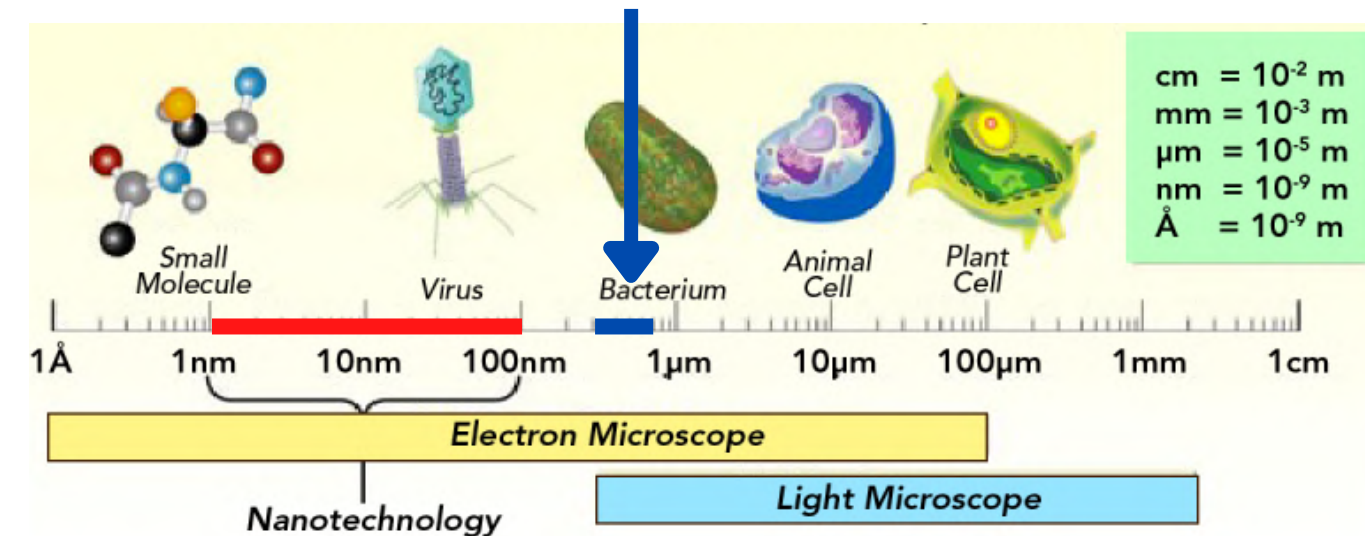
IMAGINE THE DIMENSIONS

1 nano metre (nm) is to a tennis ball what a tennis ball is to the earth

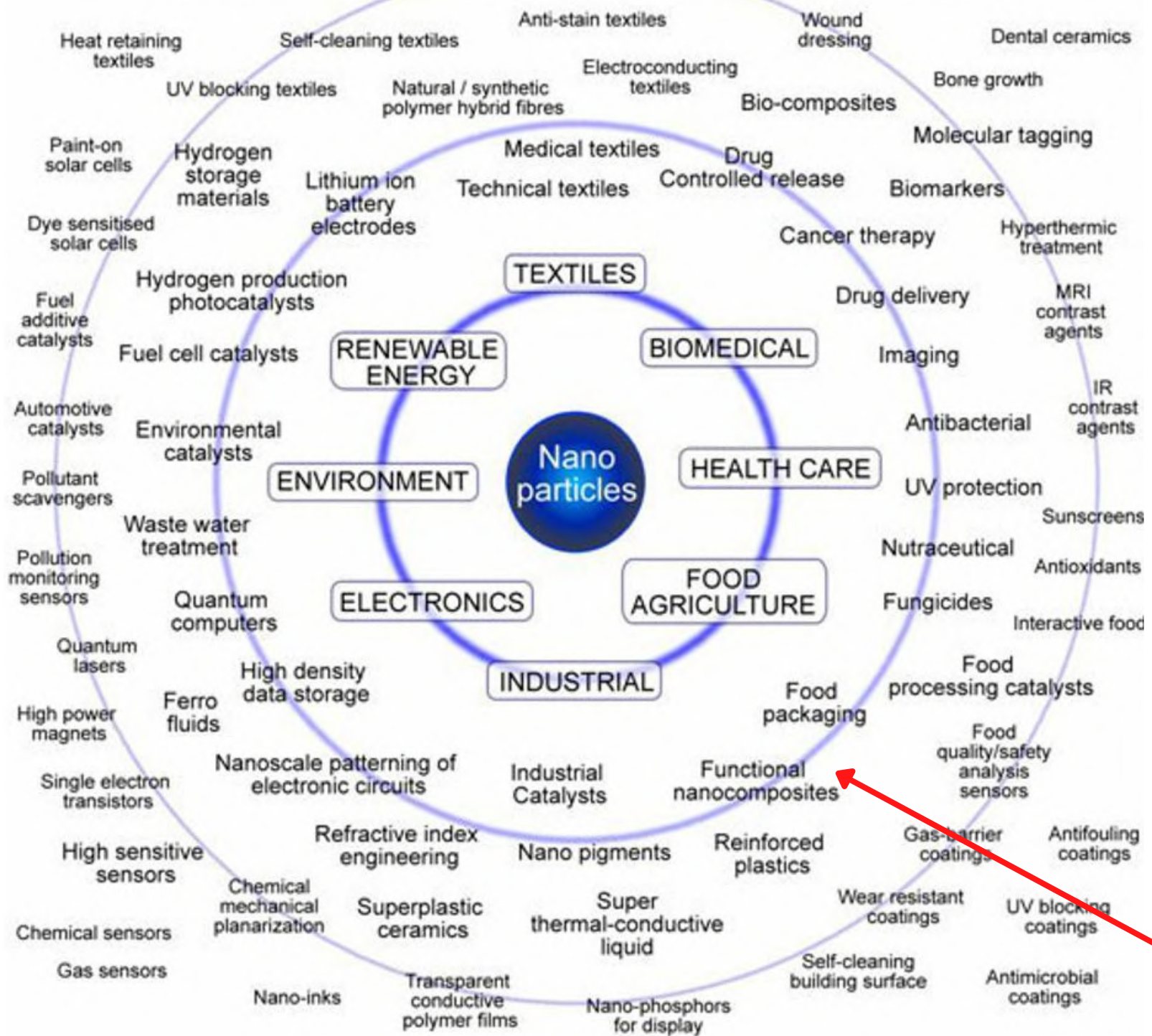


UNIMAGINABLE DIMENSIONS

Visible light to humans: 380 to 700 nm



APPLICATIONS OF NANOPARTICLES



Practical Examples

Where's Nanotech used?

- 
- **Automotive:** Car parts to improve their durability, reduce friction, and protect against corrosion.
 - **Solar / PV:** Solar panels to improve efficiency and reduce cleaning time, water and other resources
 - **Aerospace:** Aircraft components to improve their durability and reduce wear and tear.
 - **Medical:** Medical devices, such as catheters and stents, to improve their biocompatibility and reduce the risk of infection.
 - **Electronics:** Electronic devices, such as smartphones and laptops, to improve their durability and protect against water and dust.
 - **Construction:** Building materials, such as concrete and steel, to improve their durability and protect against weathering.
 - **Military:** Military equipment, such as vehicles and weapons, to improve their durability and protect against corrosion.
 - **Sports:** Sports equipment, such as golf clubs and tennis rackets, to improve their performance and durability.
 - **Etc!**

Includes:



- **Hydrophobic**
- **Anti-Corrosion**
- **etc**

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LADIES & GENTS,
WHAT **NANO SURFACE
PROTECTION** CAN WE OFFER YOU
TODAY?

AND ON WHAT **SUBSTRATE**
WOULD YOU LIKE THAT
PROPERTY APPLIED,
PLEASE?

- ANTI-ABRASION
- **ANTI-CORROSION**
- ANTI-DIRT / SELF CLEANING
- ANTI-GRAFFITI
- ANTI-FOULING/MOLD
- **ANTI-WET/STICK (HYRDOPHOBIC)**
- ANTI-MICROBIAL
- ANTI-REFLECTION
- ANTI-SCRATCH
- FLAME RETARDANCY
- HEAT RESISTANCE
- SELF-HEALING
- THERMAL BARRIER
- ETC.

- CONCRETE
- METAL
- STONE
- GLASS
- CERAMIC

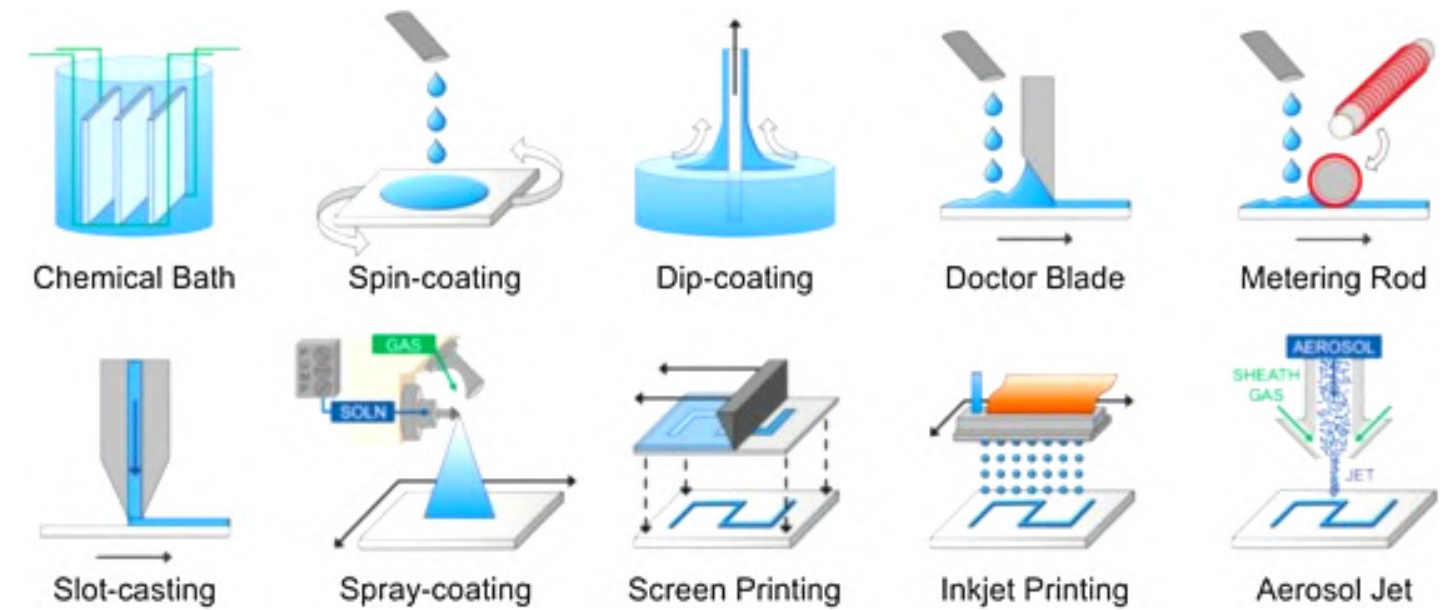
- PLASTIC
- WOOD
- COMPOSITES
- PAPER
- LEATHER

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HOW IS NANOCOATING APPLIED ONTO A SUBSTRATE?



Illustration of substrate nano-spray-coating



Other substrate nano coating techniques



**There's a whole range of application techniques.
When to use which depends on what's required.**

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HERE'S HOW

LOTUS NANO ENSURES BEST RESULTS



INDEPENDENT ADVISE, CONSULTING, FREE TRIALS

We make sure we first understand you and you understand Nano Surface Coatings. We run free product trials to determine what works best for you. We find bespoke automation solutions & train your people and so much more.



PROPER SURFACE PREPARATION:

The surface to be coated must be properly cleaned and conditioned in order to ensure that the coating adheres properly and provides the desired performance.



SAFE & ACCURATE APPLICATION:

The coating must be applied using the correct techniques and equipment to ensure uniform coverage and thickness.



QUALITY OF THE COATING MATERIAL:

The coating material must be of high quality and purity to ensure that it performs as expected and has the desired properties.



COMPATIBILITY WITH THE SUBSTRATE:

The coating material must be compatible with the substrate in order to adhere properly and not cause any damage or degradation.



OPTIMAL DRYING AND CURING CONDITIONS:

The drying and curing process must be carefully controlled to ensure that the coating is properly cured and achieves desired properties.



POST-PROCESSING AND MAINTENANCE:

The coated surface must be properly maintained and protected in order to preserve the performance of the coating over time.

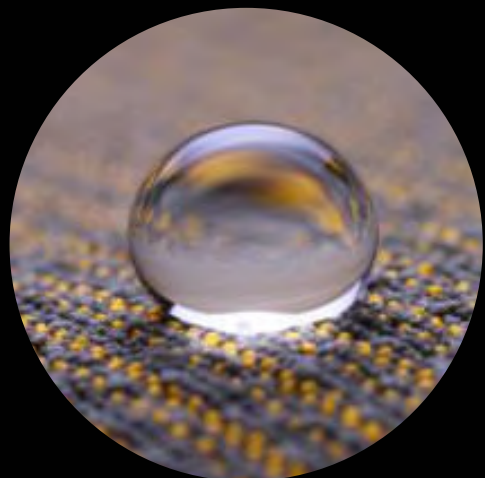
EXAMPLE 1

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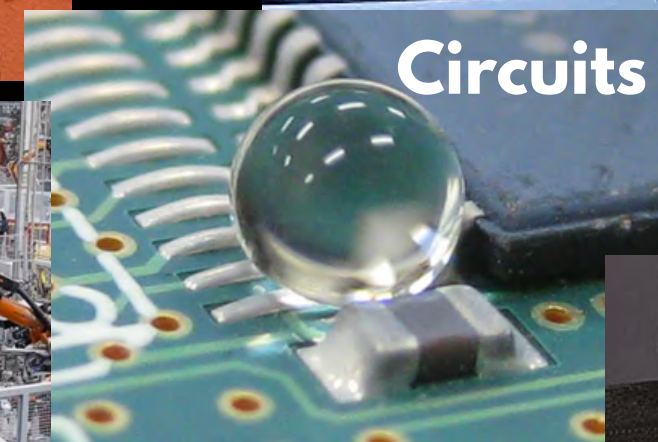
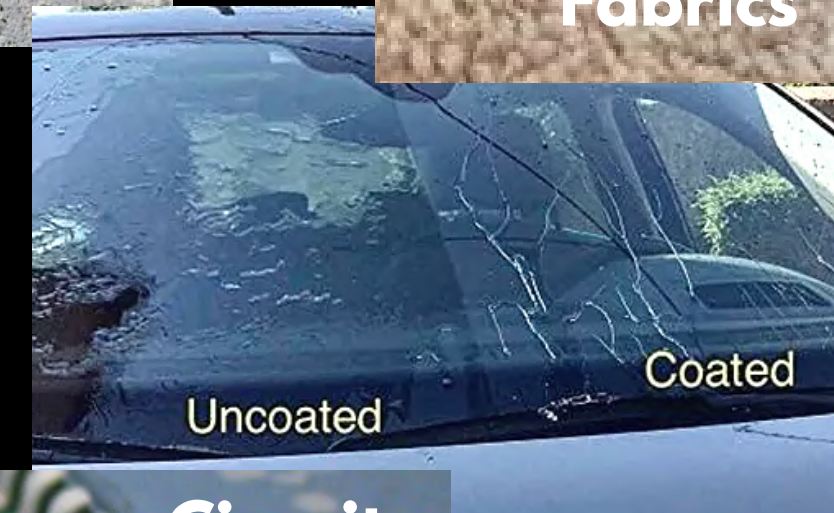
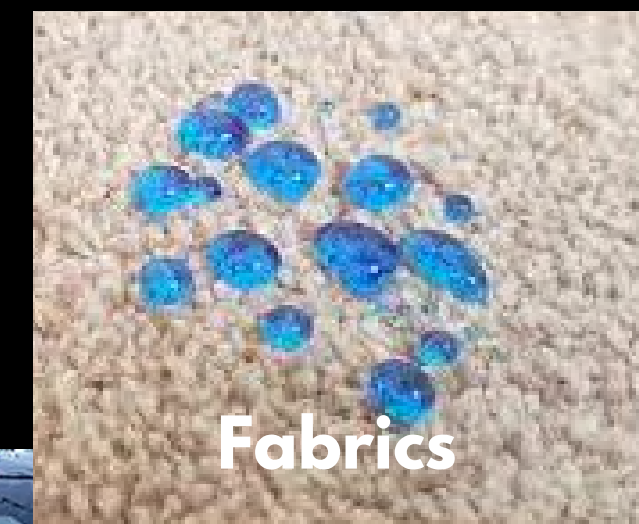
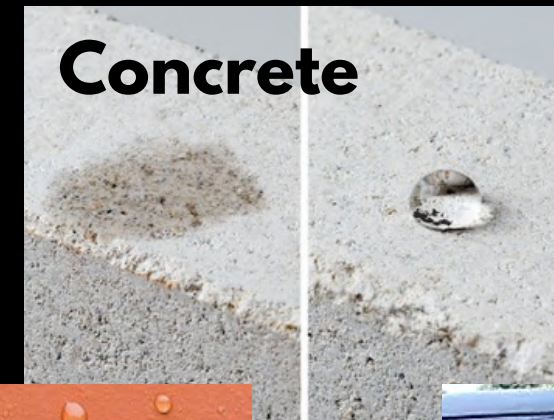
**Want a surface with same properties
as a LOTUS LEAF has?**

THE LOTUS EFFECT CAN BE APPLIED NEARLY ANYWHERE.
LET'S LOOK AT:

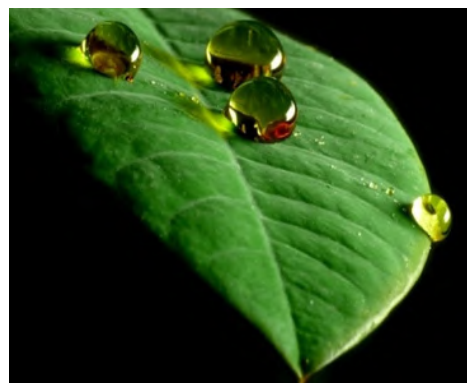
HYDROPHOBIC COATING



HYDROPHOBIC COATINGS IN ACTION. TOTAL REPELLENCY FROM - JUST ANYTHING!



And so many more!



HYDROPHOBICITY

NATURE'S LOTUS EFFECT

KEY PROPERTIES THAT MAKE THEM USEFUL IN A VARIETY OF APPLICATIONS:

Low surface energy: Hydrophobic coatings do not readily interact with water or other liquids. This makes them more resistant to wetting and allows them to easily bead up and roll off the surface.

High contact angle: A hydrophobic coating has a high contact angle, which refers to the angle at which a water droplet sits on the surface. The higher the contact angle, the more difficult it is for the droplet to wet the surface.

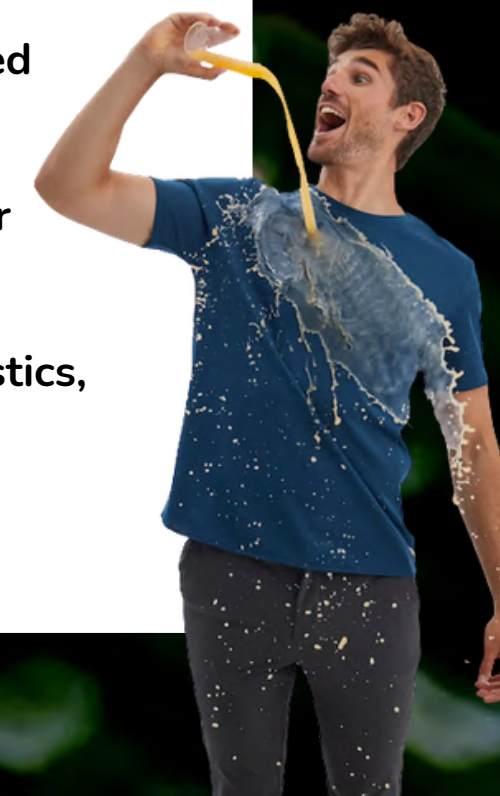
Chemical resistance: Hydrophobic coatings are typically resistant to a wide range of chemicals, including acids, bases, and solvents. This makes them suitable for use in a variety of applications.

Durability: Hydrophobic coatings are generally very durable and can last for a long time without fading or degrading.

Easy to apply: Many hydrophobic coatings are relative easy to apply and can be sprayed or brushed onto a surface.

Non-toxic: Most hydrophobic coatings are non-toxic and safe to use on a variety of surfaces - after curing.

Versatility: Hydrophobic coatings can be used on a wide range of materials, including metals, plastics, ceramics, and glass, etc.



ENDLESS APPLICATIONS OF THE HYDROPHOBIC NANO-COATINGS



Hydrophobic coatings offer even more outstanding secondary properties: good chemical and corrosion, heat- and antimicrobial resistance.



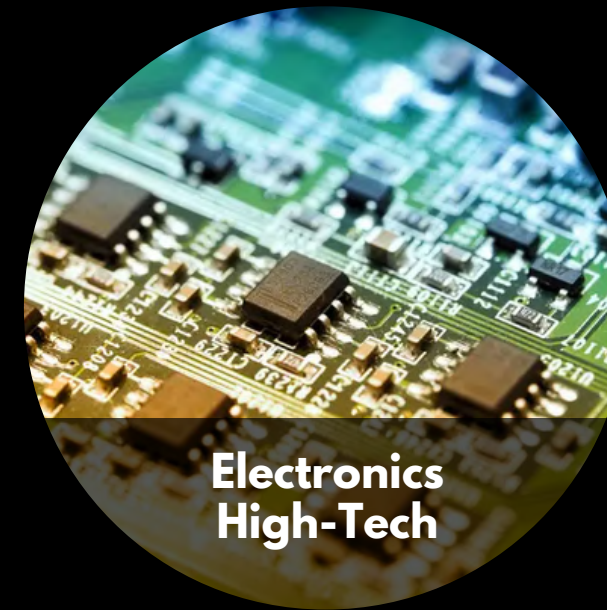
**Maritime /
Ship Building**



**Textiles &
Fabrics**



**Modern
Mobility**



**Electronics
High-Tech**



**Logistics &
Supply Chain**



**(Renewable)
Energy**



Healthcare



Construction



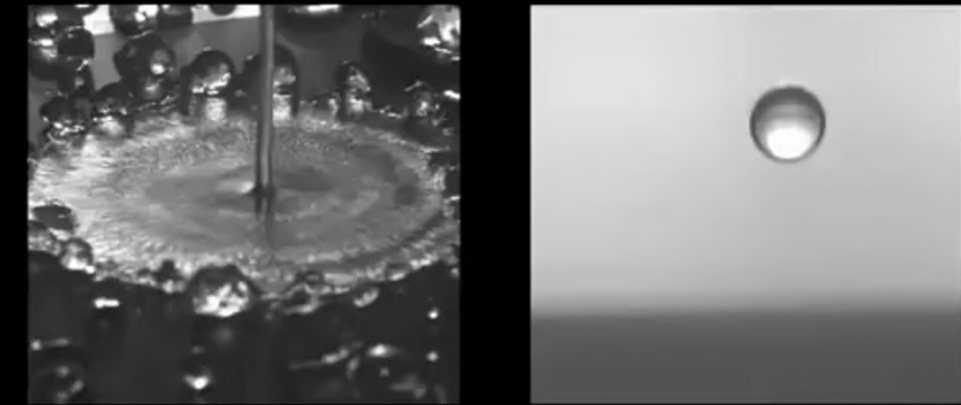
**Industrial &
Manufacturing**



**Pharma &
Biotech**

WHAT'S HYDROPHOBIC LIKE - IN REAL LIVE?

LOTUS NANO



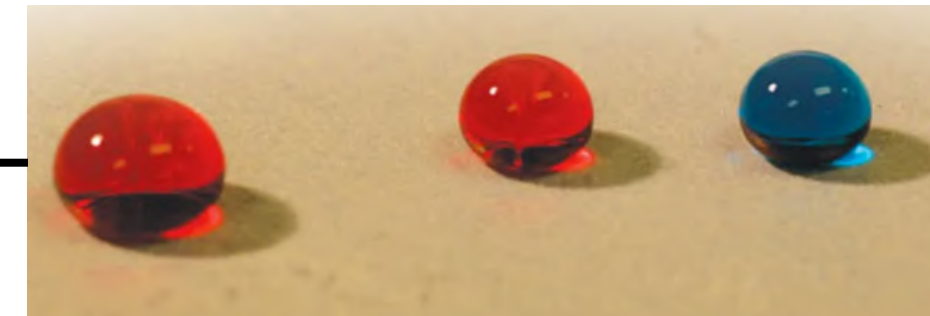
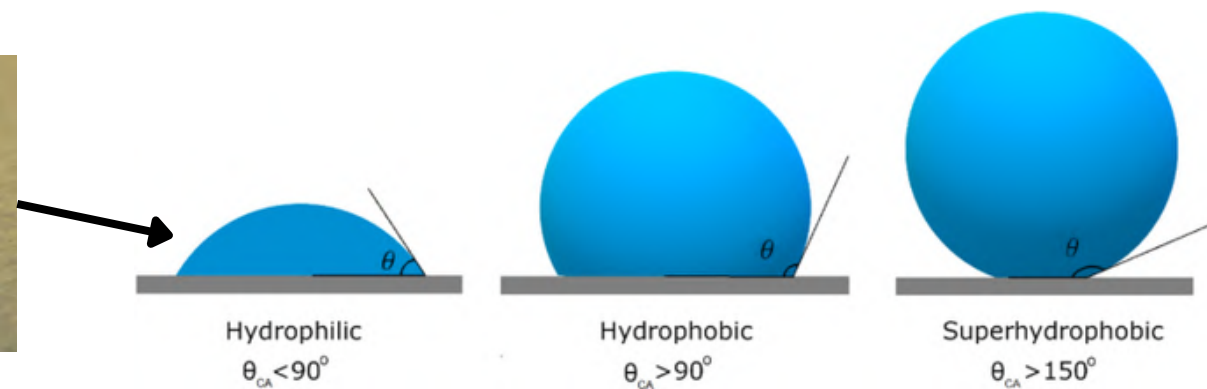
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WHAT'S IN A **CONTACT ANGLE** OF A DROP OF WATER?

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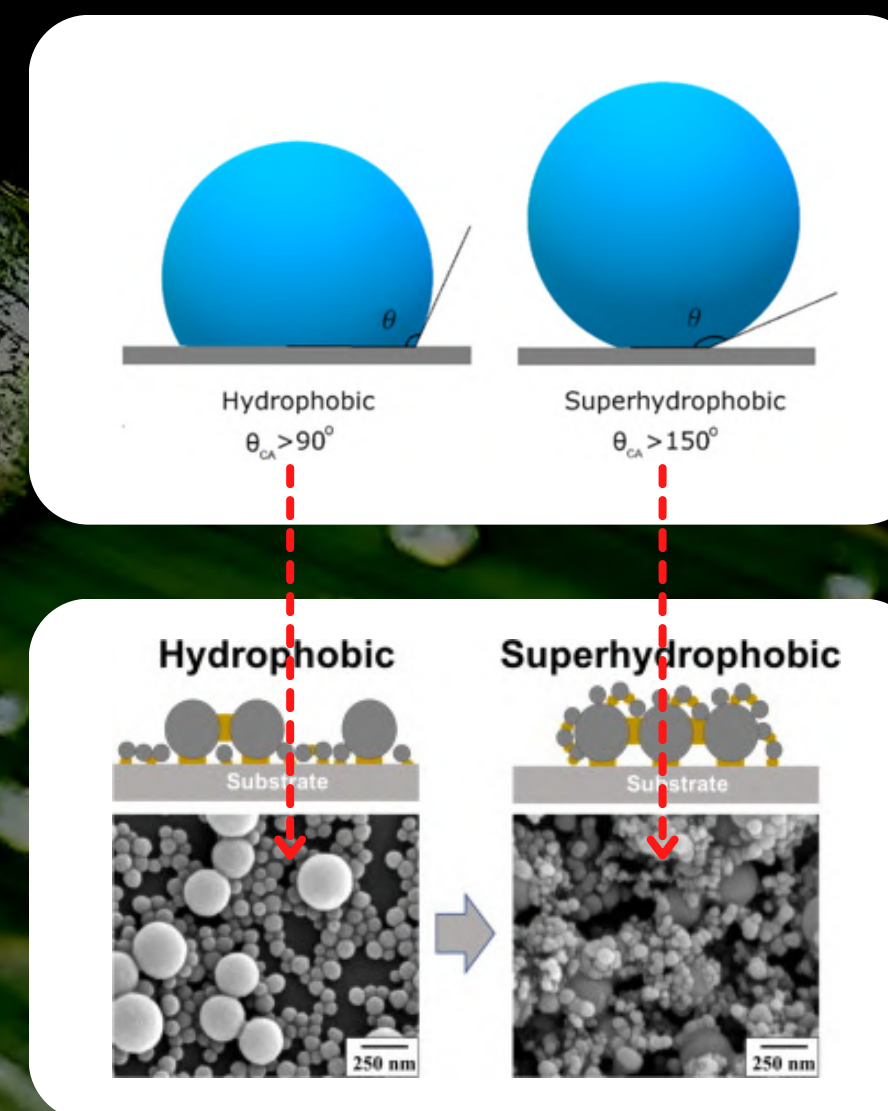
Remember this about Nanotech:

"Nanocoating covers a substrate completely. It becomes the new surface with new (desired & long-lasting) properties"



HYDROPHOBICITY *

- Excellent non-stick properties
- Easy stain wash / wipe off
- Reduction of cleaning efforts
- Reduction of cleaning abrasion
- Environmentally friendly
- Total foreign particle repellency
- Years of lasting lotus effect
- UV-stable
- Abrasion resistant
- Chemically resistant
- Chemically inert
- Food, pet and kids safe
- Heavily used in nearly ANY INDUSTRY!



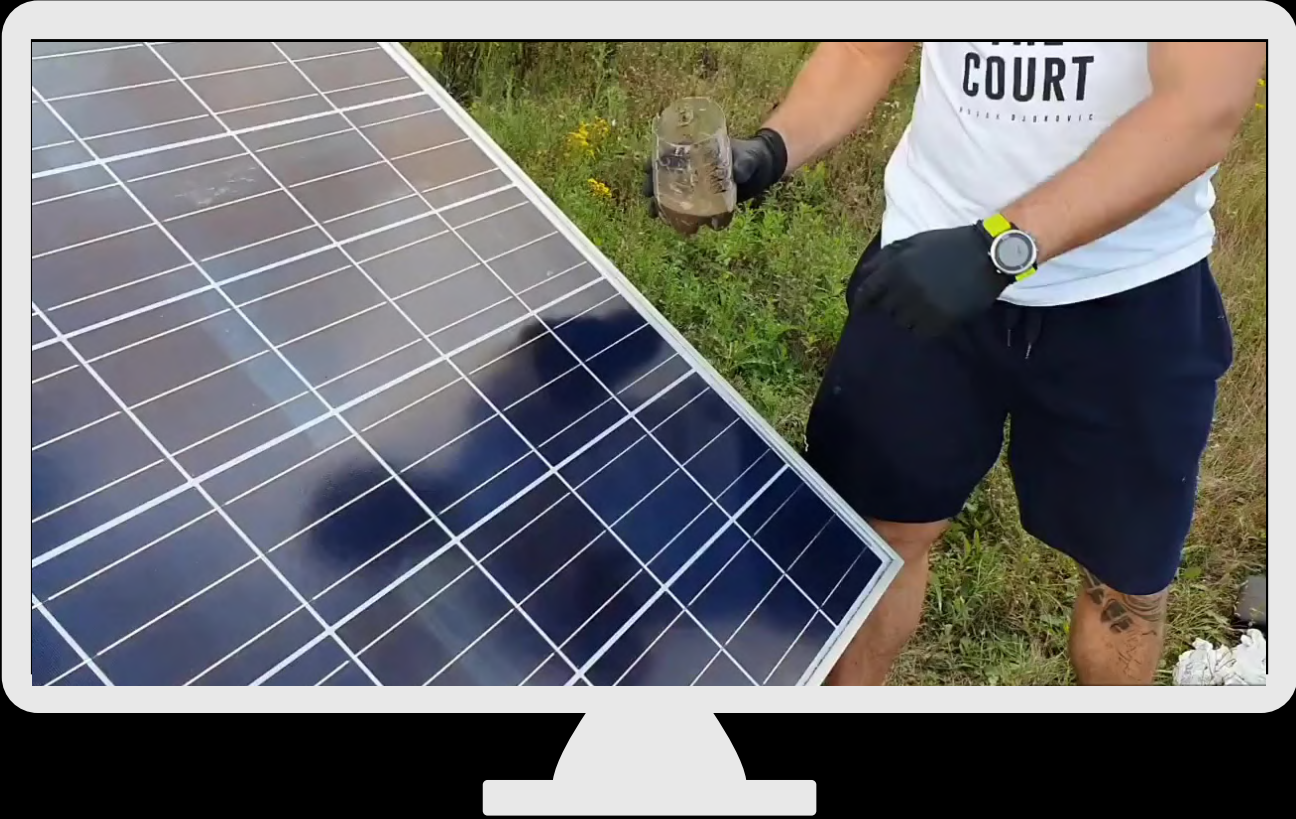
*SUPER-HYDROPHOBICITY IS THE EXTREME AMPLIFICATION OF THE HYDROPHOBIC EFFECT.

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SPECIAL EXAMPLE:
HYDROPHOBIC
SOLAR/PV NANO
COATINGS



ASK FOR A SOLAR TRIAL!



Our Solar / PV
Case-Study

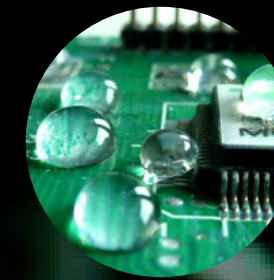


WOW ...
The "Lotus Effect" can easily be applied on Solar/PV panels with up to 15% efficiency gains and lasting for years before the effect wears off.

Because nothing really sticks on the panels, less and less-harsh cleaning is needed with a lot less or even no water at all!

Another special Hydrophobic Application

ELECTRICAL CIRCUITS PROTECTIONS



- **Displaces moisture**, quickly dries out electrical systems
- **Eliminates moisture** induced short circuits, even if surface is already wet or has been inundated.
- **Long-lasting protection** of electrical and electronic equipment from exposure to all forms of water; steam, humidity, condensation, fog, rain, flooding, chlorinated and salt water.
- **Restores electrical connectivity** and improves the insulation of devices affected by moisture, including oxidation and corrosion.
- **Prevents costly electrical outages** and reduces maintenance, equipment replacement and labour costs. Can be applied on circuit boards as well
- **Insulates + protects** devices securing long term faultless operation under adverse conditions.

WANT A TRIAL? GET IN TOUCH!



STRICTEST PRODUCT SPECS!

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MINIMUM PRODUCT SPECIFICATION

WE EXPECTS PRODUCERS OF (SUPER-) HYDROPHOBIC NANO-ENABLED MATERIALS TO COMPLY TO THESE POINTS:

- Strongest possible hydrophobicity ('Lotus Effect')
- Strong non-stick properties (shall prevent build up altogether)
- Excellent easy-clean effect (Preferably without any water at all)
- Minimum Product Guarantee of 2 years.
- Economical viability

DEPENDING ON USE-CASES:

(think "Solar" for example):

- Should reduce cleaning time by min. 25% compared to use of non-nano enabled cleaning agents
- Should reduce cleaning cycles by min. 25% compared to use of non-nano enabled cleaning agents
- Should reduce water consumption by min. 25% compared to use of non-nano enabled cleaning agents

WE ALSO LOOK FOR:

- ISO 11507 (a.o.) certified
- Product certifications / lab tests issued by industry-relevant bodies and ready for verification
- Suitable for any scale industrial usage
- (Food), infant & pet / home-use safe
- Nano layer < 80nm
- Layer 100% invisible
- No alteration of substrate properties in any way
- Product of India ("Make in India" Initiative).
- Accepted and used safely in at least 20 countries
- Easy to apply with any coating technique
- Quick curing time (<60 min to the touch, <24 hrs to fully cure)
- Excellent abrasion resistance
- UV-stable
- Excellent chemical resistance
- Biological and environmental proof of safety
- Demonstrated lifecycle sustainability
- Able to scale production
- Quality Management System in place
- Professional and responsible management

EXAMPLE 2

**TROUBLE WITH
RUST / CORROSION?**



LONG LASTING, RELIABLE AND EASY TO APPLY

**NANO
ANTI-CORROSION
COATING**

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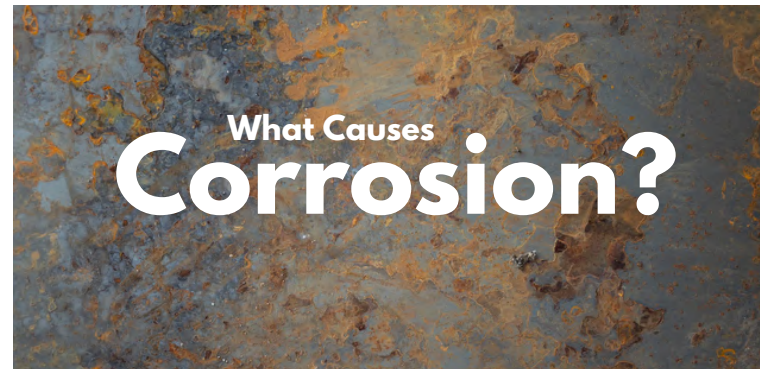
ANTI-CORROSION NANOCOATINGS



"India loses around 5-7 per cent of its GDP every year due to corrosion."

International Zinc Association (IZA), 2021 [\[Source\]](#)

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Salt

Humidity

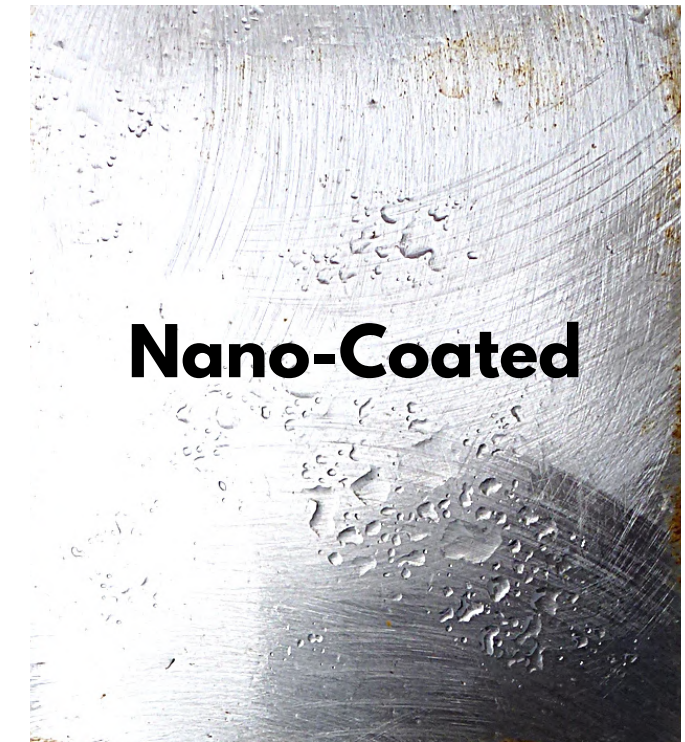
Temperature

Lubricants

Surface Moisture

Airborne Particles

Nano-Coated



Uncoated



6 Months, Saltwater, Mumbai

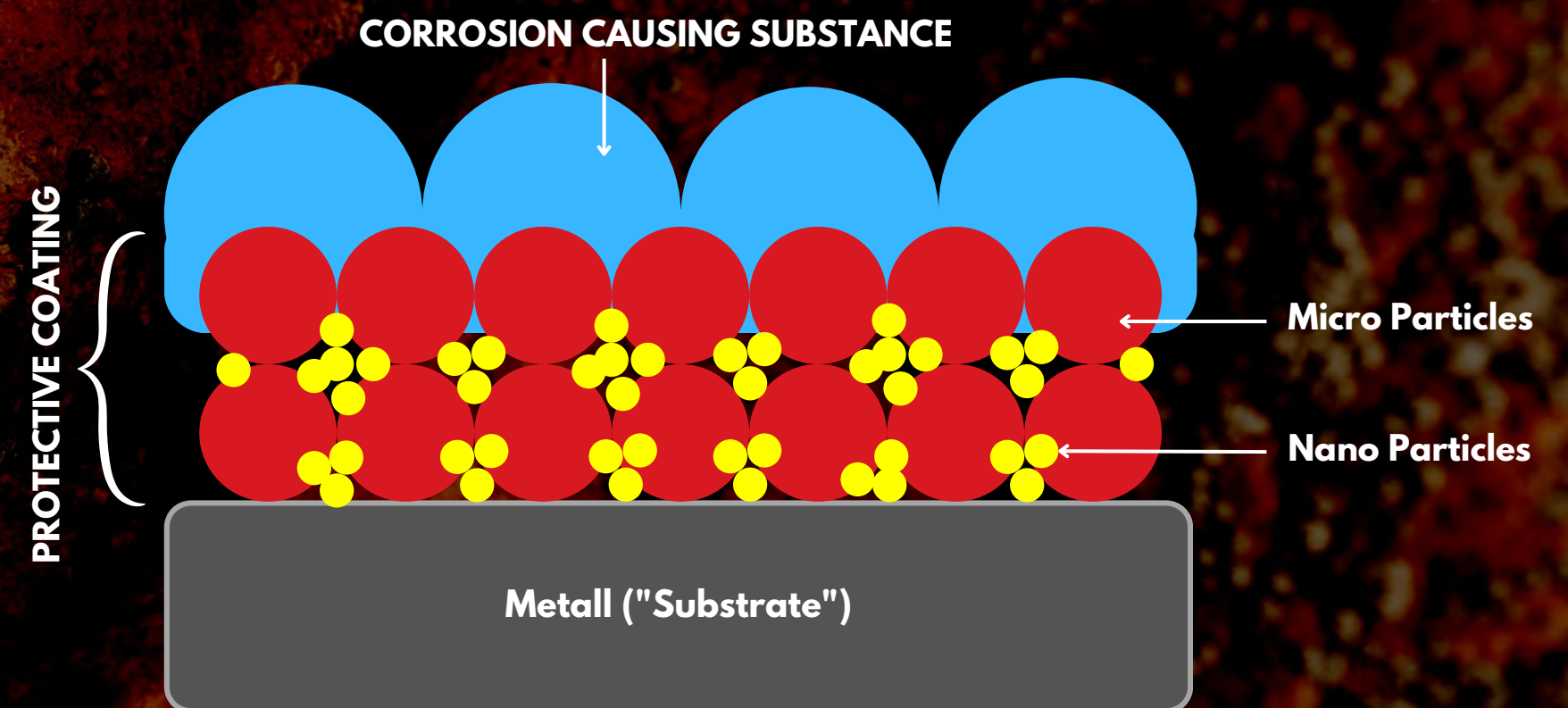
HOW DO ANTI-CORROSION NANO-COATINGS WORK?

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The Techy Stuff:

Nano sized particles fill in tiniest roughnesses, cracks and defects on the substrate and create a micro-meters thick protective barrier. Here several mechanisms by which nano-scale anti-corrosion coatings can protect metal surfaces from corrosion:

- **Physical barrier:** Forms a physical barrier between metal surface and the environment, preventing contact between metal and corrosive agents such as water, oxygen, and acidic or alkaline substances.
- **Chemical barrier:** Forms between the metal and the environment, reacting with the corrosive agents and neutralising them, or forming an oxide layer on the metal surface that is more resistant to corrosion.
- **Electrochemical protection:** The coating modifies the electrochemical reactions that occur at the metal surface, shifting the corrosion potential of the metal and reducing the rate of corrosion.
- **Cathodic protection:** The coating can act as a cathodic material, meaning it can donate electrons to the metal surface and prevent the metal from corroding.



Your Take-Away:



The goal of an anti-corrosion nano-coating is to create a protective barrier that prevents the substrate from coming into contact with corrosive agents, such as oxygen, water, and salt.

This helps to extend the lifespan of the substrate and reduce the need for maintenance and repair.

Anti-Rust + Corrosion

APPLICATIONS

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Particularly suitable for smooth, non-absorbent metal surfaces -

- Aluminium
- Zinc
- Steel
- Tin
- Copper
- Alloys (e.g. brass and bronze)
- etc.



Works on 1 or 2 component paints:

- Polyurethane
- Epoxy systems
- Polyester paints
- GRP (fibreglass)

Industries using Anti-Corrosion Coatings:

- Metal processing industry
- Automobile industry
- Industrial plants and equipment
- Governments
- Public Transport
- Facilities Management
- Heating, Ventilation, Air Conditioning (HVAC)
- Ship-building & Shipping & Maritime
- Fleets, Logistics
- Mining
- Telecom
- Furniture, Fixture and Fittings
- Construction
- Oil & Gas
- Renewable energy
- Airlines
- Rocket Science, Space Exploration
- Military
- Pharma / Healthcare
- etc etc etc

We make no compromises

STRICTEST PRODUCT SPECS!

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MINIMUM PRODUCT SPECIFICATION

WE EXPECTS PRODUCERS OF ANTI-CORROSION NANO-ENABLED MATERIALS TO COMPLY TO THESE POINTS:

- Coating to be "thicker" (μm) than hydrophobic coats
- Outstanding molecular bonding (quantum-physics)
- Near 100% transparent permanently bonding substrate layering
- Long lasting (2-5 years) effect
- Usable on any metal surfaces with same effect
- No alteration of substrate properties in any way
- To exhibit hydrophobic & oleophobic properties
- No self-leaching into the environment allowed
- Performance in harsh environmental conditions
- Great chemical, temperature & abrasion resistance
- Economical consumption
- Negligible danger to nature & living beings

WE ALSO LOOK FOR:

- Proof of relevant local & international certifications
- Product certifications / lab tests / safety sheets issued by industry-relevant, verifiable bodies
- Suitable & safe to use for any scale industrial applications
- Indoor / Outdoor safe for humans and pets
- Barrier anti-corrosion layer not to exceed $10\mu\text{m}$.
- Layer closest to 100% invisible
- Product of India ("Make in India" Initiative)
- Accepted and used safely in at least 10 countries
- Easy to apply with any coating technique
- Quick curing time (<60 min to the touch, <24 hrs to fully cure)
- Excellent abrasion resistance
- Temperature resistance from (at least) -40°C to $+800^{\circ}\text{C}$
- UV-stable
- Excellent chemical resistance
- Demonstrated lifecycle sustainability
- Producer is able to scale production
- Auditable Quality Management System in place
- Professional and responsible management



THE POSSIBILITIES ARE ENDLESS.

**MAKE NANOTECH WORK FOR YOU.
YOUR COMPETITORS CERTAINLY WILL.**

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IT IS OUR MISSION TO MAKE
NANOTECH WORK FOR THE
WORLD. HERE'S TO -

- MORE EFFICIENCY
- MORE SUSTAINABILITY
- MORE PROFITABILITY



- **Startup - Industrial Applications of Nano Products**
- **Independent and unbiased advise and consulting**
- **Headquartered in Pune, India.**
- **German / Indian management**
- **Producer-independent**
- **We preferably source locally and support "Make-in-India" initiative.**
- **We buy only from vetted high-quality producers**
- **Applies best practices, highest health, safety & environmental standards**
- **One-stop "everything nano" support and client-site project execution**
- **Engineering solutions which integrate nanotech into production lines**
- **We employ only skilled professionals**
- **We are a modern learning company**
- **Pays fair wages on time and cares for its people**
- **Equal-opportunity employer**
- **No child labour ever with us**
- **No-questions-asked warranty for all our work + full manufacturer guarantee**

WE'VE GOT

ALL NANO COATING SOLUTIONS

IN STORE FOR SPECIFIC INDUSTRIAL AND
COMMERCIAL SETTINGS



the incredible world of surface protection

TOP 9 NANO-COATINGS YOUR BUSINESS SHOULD BE USING TODAY

1. Anti Corrosion
2. Fabric & Textile
3. Electrical & Circuits
4. Antimicrobial
5. Glass & Ceramic
6. Stone & Brick
7. Solar & PV
8. Anti Graffiti
9. Anti-Fog

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