Nanocoat®

Antiviral, antibacterial and antifungal surface treatment

Sobinco
OPENS YOUR LIFE

WHAT IS NANOCOAT®?

It is the **only coating** for aluminium handles that works **on 3 levels simultaneously**:

- **Antiviral (unique).**
  - Very few studies have reported materials or surfaces with antiviral properties. Hsu, B. B. at Al.
  - Mechanism of inactivation of influenza viruses by immobilized hydrophobic polycations. Proc. Natl. Acad. Sci. U. S. A. 2011, 108, 61–66.
- **Antibacterial**.
- **Antifungal (unique).**

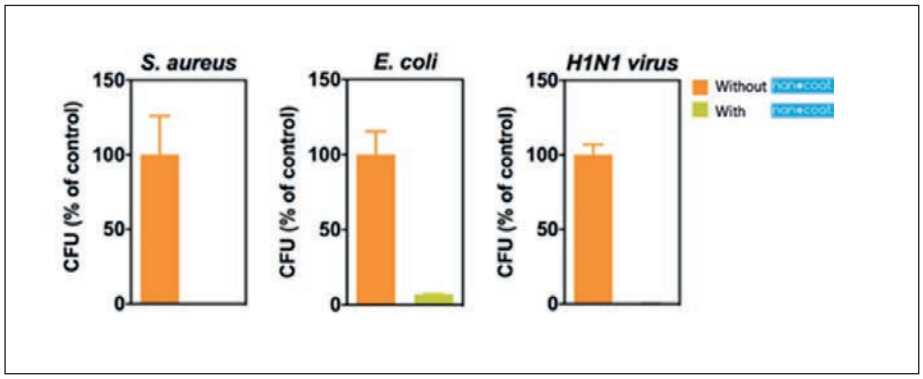
Intellectual propriety technology, **patent protected**. Nanocoat® is a **registered trademark** and a product of Sofi®. Joint project from STA (Portugal), Sobinco (Belgium) and the Biogenetic Laboratories of the Coimbra University (Portugal).

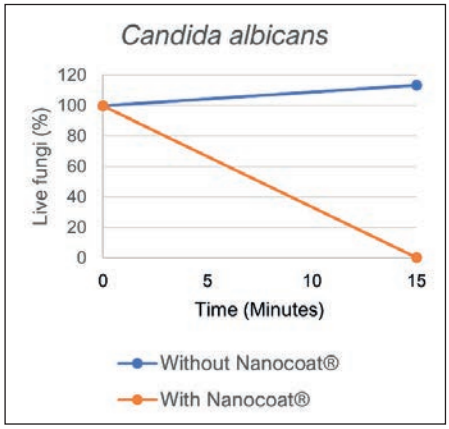
CHARACTERISTICS

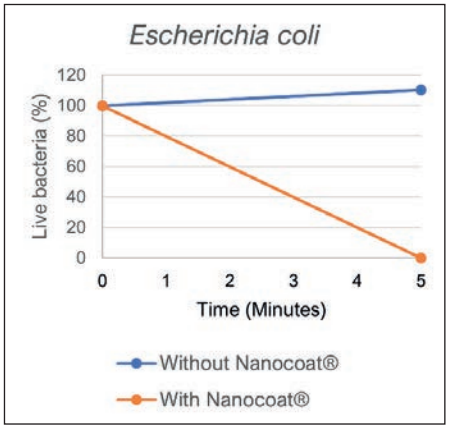
GREATER EFFECTIVENESS

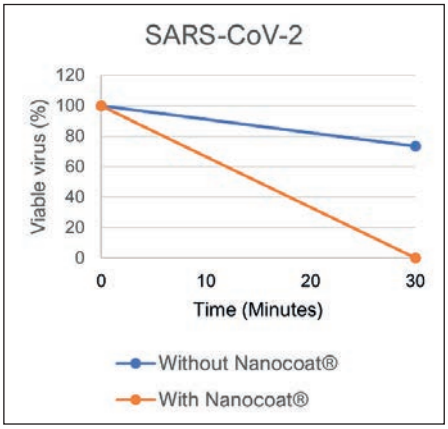
Test performed against C.Albicans, SARS –COV-2, non enveloped Influenza MS2 H1N1, S. aureus and E. Coli. **In all tests there are no more living micro-organisms after 30 minutes**. In some applications even in a matter of minutes.

Anodisation

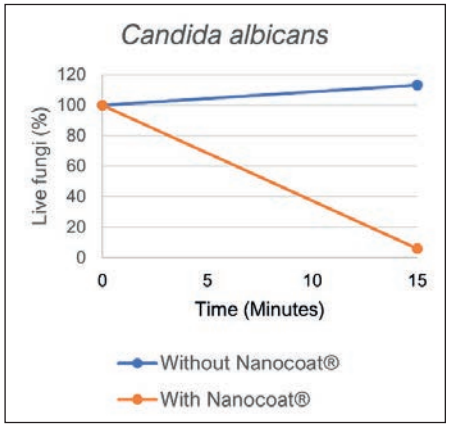


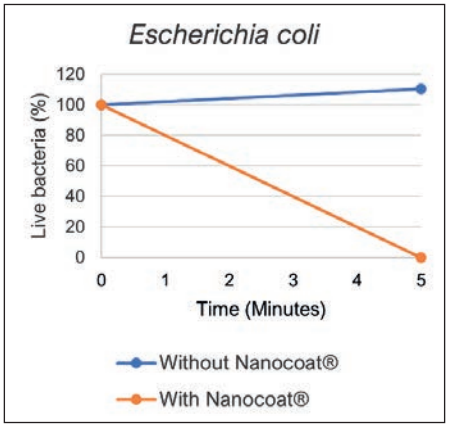


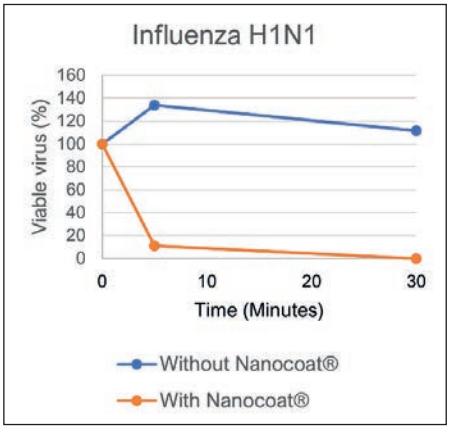


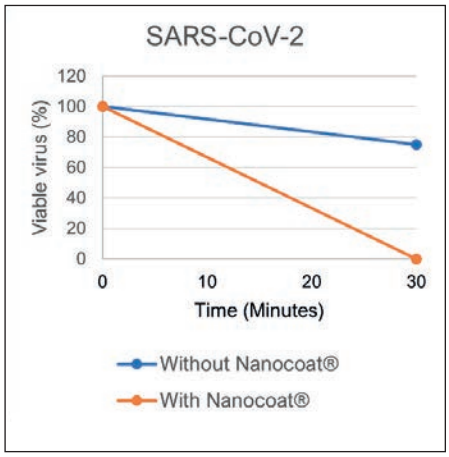


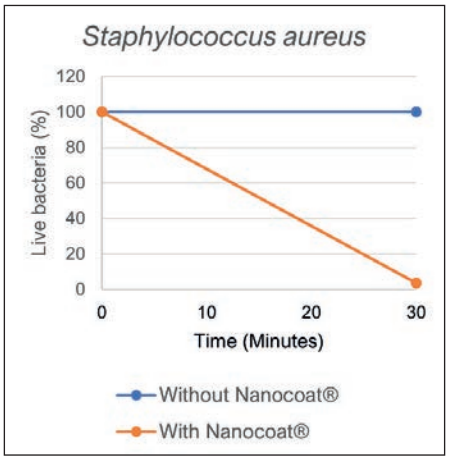
Powder coating











ANTIBACTERIAL

Very high antibacterial activity without leaching.

Table 3: Antibacterial activity of all tested samples

Samples	Mean		Antibacterial activity (Log)	Antibacterial activity (%)
	CFU/cm²	Log_{10} CFU		
E. coli				
Control (9, from 23/11/2020))	$1.29x10^4$	4.11 [1]	-	
Sample 1	$8.00x10^1$	1.90 [2]	2.21 [3]	99.4
Sample 2	0	- [2]	4.11 [3]	99.99
Sample 3	$1.11x10^0$	0.05 [2]	4.07 [3]	99.99
Sample 4	0	- [2]	4.11 [3]	99.99
Sample 5	$4.44x10^0$	0.65 [2]	3.46 [3]	99.97
Sample 6	0	- [2]	4.11 [3]	99.99
Sample 7	0	- [2]	4.11 [3]	99.99
Sample 8 (stainless steel)	$5.97x10^2$	2.78 [2]	1.34 [3]	95.4

[1] Log10 of the CFU number determined 5 minutes after inoculation of the control (untreated) material.

ANTIVIRAL

Very high antiviral activity without leaching. Specific Tests were done on the speed of killing the virus and we found speed of reaction between 2 and 4 sec.

Table 6: Antiviral activity of selected samples after contact with virus suspension, calculated relative to the control at the same time point.

Samples	Mean		Antiviral activity (Log)	Antiviral activity (%)
	PFU/cm²	Log_{10} PFU		
H. Influenzae H1N1				
Control 0 min (white handle)	$1.54x10^5$	5.19 [1]	-	-
Control 4 sec (white handle)	$3.17x10^5$	5.50 [1]	-	-
Control 5 min (white handle)	$2.06x10^5$	5.31 [1]	-	-
Control 30 min (white handle)	$1.72x10^5$	5.24 [1]	-	-
Sample 3 4 sec	$4.43x10^5$	4.99 [2]	0.51 [3]	68.9
Sample 3 5 min	$9.82x10^4$	4.34 [2]	0.97 [3]	89.4
Sample 3 30 min	0	- [2]	5.24 [3]	99.999
Sample 4 5 min	$1.69x10^4$	4.23 [2]	1.09 [3]	91.79
Sample 4 30 min	0	- [2]	5.24 [3]	99.999

[1] Log10 of the PFU number determined after contact with the control (untreated) material.

[2] Log10 of the PFU number determined after contact of the virus with the treated material.

[3] Difference between [1] and [2]. Quantifies the antiviral activity

ANTIFUNGI

Very high antifungi activity without leaching.

Table 8: Antifungal activity of the lacquered and anodized handles from 11th of May 2021

Samples	Mean		Antifungal activity (Log)	Antifungal activity (%)
	CFU/cm²	Log_{10} CFU		
Candida albicans				
Control	$4.94x10^4$	4.69 [1]	-	
Anodized	$9.96x10^1$	2.00 [2]	2.70 [3]	99.8
Lacquered	$2.64x10^3$	3.42 [2]	1.27 [3]	94.7

[2] Log10 of the CFU number determined 15 minutes after inoculation of the control (untreated lacquered) material.

[3] Log10 of the CFU number determined after 15 minutes contact of the fungal inoculum with the treated material.

Difference between [1] and [2]. Quantifies the antifungal activity

GREATER DURABILITY

To proof durability of the anti germ activity, traditionally 1000 to 1500 cycles are performed. **We did 10.000 cycles with Nanocoat® without decline in effectiveness.**

	Activity against E. coli (5 min)		Activity against SARS-CoV-2 (30 min)	
	%	Log	%	Log
Anodized Aluminium	99.99	4.53	99.84	2.80
Lacquered Aluminium	99.97	3.53	99.98	3.77

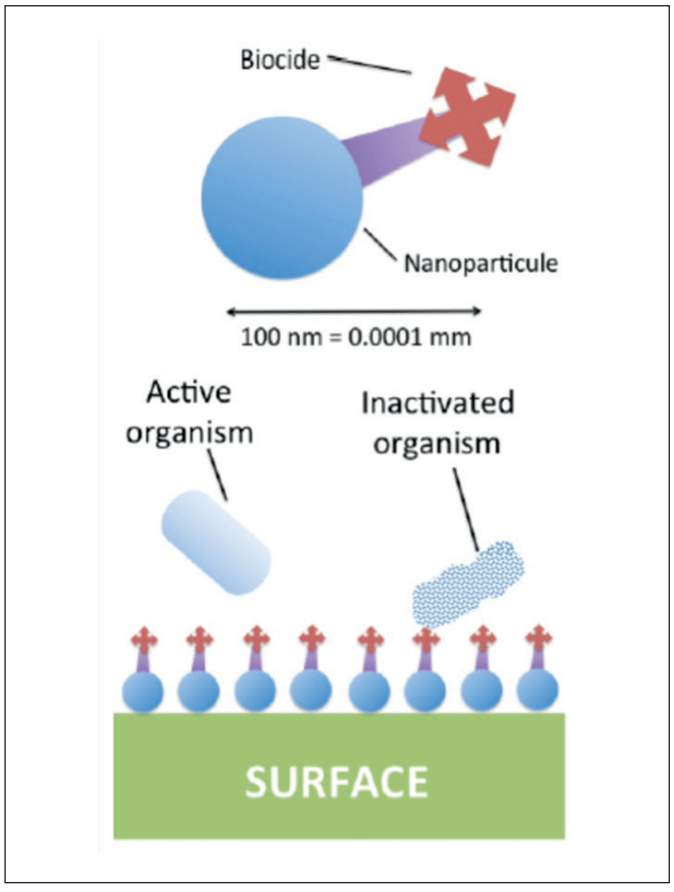
Corrosion test performed. A protection of 480 hours = grade 5 was proven. Theoretically the NP should protect more against corrosion and UV.

HOW DOES IT WORK?

The treated surface pierces the virus/bacteria/fungus cell membrane and thus **rapidly kills it the upon physical contact**. Anti-viral activity starts within seconds.

The viruses adhere to hydrophobic polycationic surfaces followed by structural damage and inactivation.
(Hsu, B. B.; “Mechanism of inactivation of influenza viruses by immobilized hydrophobic polycations”.)

So Nanocoat® does not leach to be effective.
Nanocoat® does not emit toxic components.
Nanocoat® does not use or emit heavy metals (like silver ions).

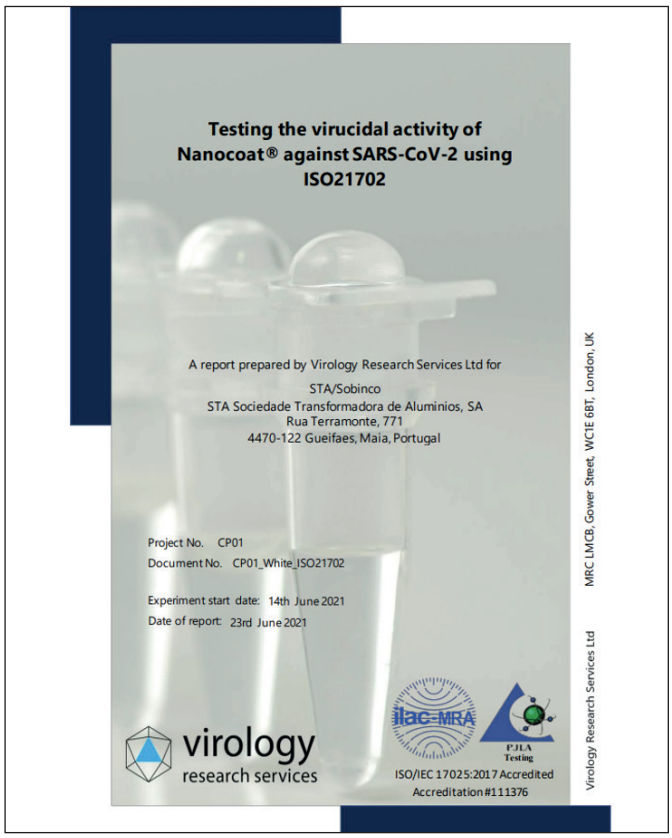


TESTS & RESULTS

Certificate **Highly Effective (99.99%) against Covid-19** according standard ISO21702 from Virology Research Services.

Certificates from Hohenstein Institute (Germany) regarding antibacterial and antiviral efficiency, according to standards ISO22196:2011-08 / JIS Z 2801:2000.

In both situations, results were excellent: growth germ reduction efficacy always on the maximum interval.
Bacteria: log KBE ≥ 5,99 ≥3 according to assessment criteria is strong.
Virus: log10 PFU ≥ 6,51 >4 according to assessment criteria is significant.



ALTERNATIVES?

Solutions that are **antibacterial only** exist.

Silver ion products (industrial and biomedical sections).

- Most common.
- Only effective when leaching (biocide needs to break free to be effective), needs refurbishing.
- Due to leaching: Toxic emissions of silver ions that are airborne after contact are the main environmental/health concerns.
- Current technologies are mainly antibacterial.
- Only works after 2h.

Titanium dioxide in paints and building materials.

- Photocatalytic process limited to be applied on surfaces exposed to light.
- Titanium Dioxide is a very toxic substance.

Companies such as AK Coatings, Bioni CS, DOW Microbial Control, EnviroCare Corporation, Sureshiels Coatings Company, Sciessent LLC, AcryMaed all commercialise **products based on Silver NPs.**

There is no alternative:

Relevant Criteria	nanocoat	Silver Nanoparticles	Titanium dioxide	Antimicrobial agent release
Non-leaching	Yes	No	Yes	No
Antibacterial	High	High	High	High
Antifungal	High	Medium	Low	High
Antiviral	High	Medium	High	High
Efficacy in the dark	High	High	Low	High
Efficacy in dry material	High	Low	Low	Low
Microorganism resistance	No	Yes	Yes/No	Yes
Washing resistance	Yes	No	Yes	No
Target market	Industrial and biomedical	Industrial and biomedical	Industrial	Industrial and biomedical

No antiviral cleaning needed when Nanocoated®. Nanocoated® works better than antimicrobial agent. Any standard cleaning (f.ex. with NaOCl, 15% Cl) of Nanocoated ® handles will not affect the antiviral activity if standard cleaning is non-abrasive to the paint Recommended cleaning: water or mild soap is enough.

Greater effectiveness and durability compared to competition (silver). The specimens were tested against Gram positive bacteria (S. aureus) and Gram negatives (E. coli) and against H. influenza virus H1N1. In all tests, following the ISO 22196 standard, the results from the samples from SOFI were above the results from a commercial sample with a technology based on the release of silver ions (Hoppe). No viable microorganism was found in the medium after 2 h while silver ion coated applications only start working after 2h.

		Actividade antimicrobiana (%) vs Controlo não tratado				
		Ambio T0	Ambio 42 ciclos	Ambio 120 ciclos	Hoppe T0	Hoppe 120 ciclos
Teste	H1N1 (20 min)	57,7	48,0	51,7	4,0	n.d.
	Norma ISO 22196 H1N1	n.d.	n.d.	100	n.d.	0,0
	Teste secagem (3h) *S.aureus*	100	89,5	25,2	0,0	0,0
	Teste secagem (3h) *E.coli*	99,2	61,7	60,5	5,5	0,0
	Norma ISO 22196 *S.aureus*	99,9	95,7	100	48,6	12,5
	Norma ISO 22196 *E.coli*	62,7	52,4	20,8	0,0	0,0

0-25 25-50 50-75 75-100

ADVANTAGES

Nanocoat® works on 3 levels simultaneously being.

- Antiviral and thus also anti covid.
- Antibacterial.
- Antifungi.

Nanocoat® does not leach.

- Long durability.
- No toxic heavy metals (Silver or Titanium dioxide) in the air.

Nanocoat® works instantly.

- When touching a treated door handle one has significantly lower risks of getting infected by the surface.
- All claims have been tested by the bio labs of the university of Coimbra and reconfirmed and certified by external independent labs.

We are Sobinco. We get things done. We specialise in the development and production of innovative locking systems and components for the aluminium windows and doors industry.

At Sobinco **the entire production process takes place under one roof**.In this way we are able to manage and control the value creation chain from start to finish. This gives us **great flexibility** and allows us **to attain sustainable results over the short term**.

Innovation is our passion. Our creativity, expertise and craftsmanship provide a guarantee of added value which translates into **high-quality products, easy assembly, modularity, sustainability and aesthetic comfort.**

Driven by this passion, **our team** at all times endeavours to **improve our current products and develop new ones**. To this end, we listen to the market and to our customers.

We use **high-quality materials** for our product development. These products are **exhaustively tested in line with the strictest of guidelines and quality requirements**. Every product must satisfy these as a minimum and their ratings often exceed the required standards.

We have a **strong customer focus**. Not only in the development of our products, but also in our after-sales support, during the installation process and even long afterwards.

Sobinco is a financially viable and high-tech environment where our specialists can focus on their strengths. With more than 60 years in the business, you can rest assured that we are a reliable partner, ready to seize the opportunity. Nevertheless, we remain approachable. In short, **a family atmosphere, where there is mutual respect** for management, customers, partners and employees.

We are Sobinco. We get things done. We listen. We think in terms of opportunities. We are not afraid to roll up our sleeves.

Waregemstraat 5 - 9870 Zulte - Belgium
T +32 9 388 88 81 - F +32 9 388 88 21
commercial@sobinco.com
www.sobinco.com

Sobinco
OPENS YOUR LIFE