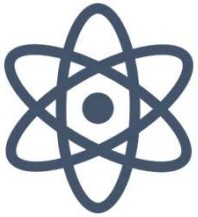
MEPRA
S. p. A.
H&R DIVISION

ABACO
ANTIBACTERIAL COATINGS

What is ABACO?

MEPRA decided three years ago to reach a goal: to obtain an **antibacterial coating** thanks to the PVD technology.



The result is ABACO.

ABACO is the first and unique antibacterial coating that adds to the extraordinary properties of our PVD technology an incredible capacity **to block the bacteria proliferation on surfaces.**

What is PVD?

PVD is the abbreviation of Physical Vapor Deposition and it is a technology applied for the deposition of a thin film coating on different surfaces (metals and non-metals).

It is a batch process. During the process the products are loaded on specific looms and collocated in a cylindric room (deposit room) where different pumps (mechanical, diffusion and turbo-molecular) create a vacuum effect. The solid metal to be deposit evaporates from metallic targets collocated on the walls of the space, determining the ions formation. Consequently, thanks to the kinetic energy and the potential difference of the elements, the ions move and condense themselves on the surface, where they create the desired coating. During the deposition it's possible to introduce a specific gas . The reaction caused by metallic ions and ionised gas, forms different chemical composites (for example: titanium nitride, zirconium nitride, chrome nitride, titanium oxide) in specific colours.

There are different technologies in use to evaporate the metal and to define different processes: the Cathodic Arc Deposition (CAD) or the Magnetron Sputtering Deposition (MS) .

What is PVD/CAE?

The ABACO coatings are obtained through the CAE **(Cathodic Arc Erosion)** process**:**

The solid evaporation of the metal is caused by a device that generates an electric arc on the metal surface to be evaporated. The electric arc melts the sublimated metal.

What is PVD/CAE?

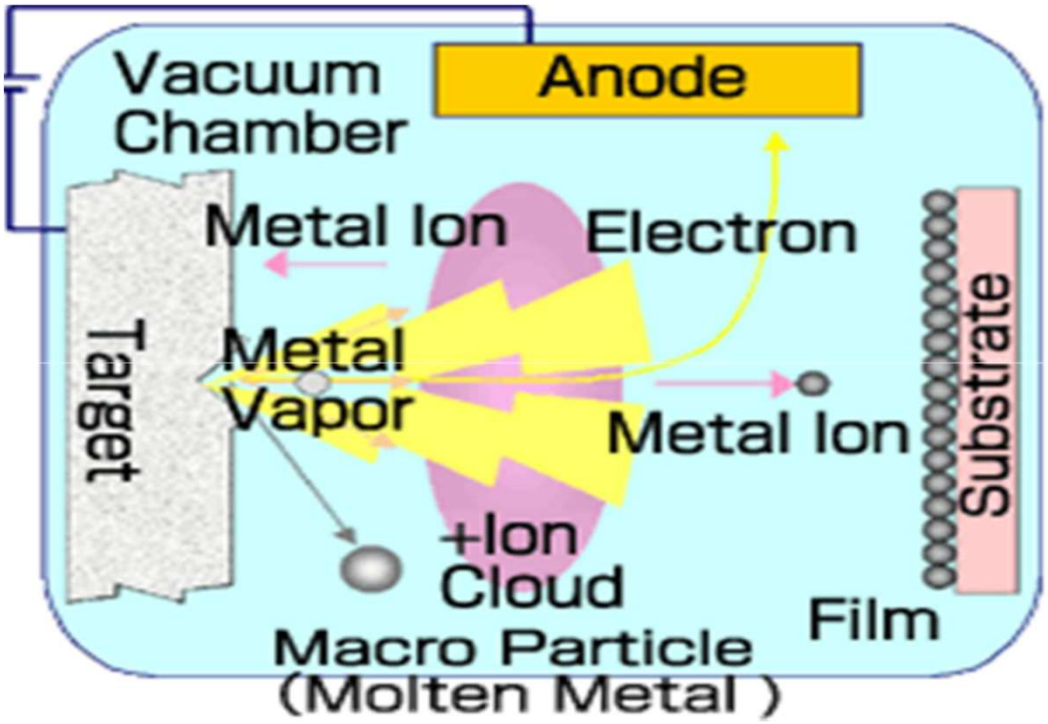


Figure 1: CAE process scheme

What is Decocoat 1100?

- To obtain the ABACO coatings, a new machinery called Decocoat 1100 has been built up. The first machinery has been recently installed and is actually ready to start the production.
- This means that the ABACO coatings are now available for the mass production.

How the ABACO coating works?

An electronic microscopic scansion (SEM) shows the antibacterial ions that form regrouping (nano inclusions) in the complex architecture of multilayer coating.

This antibacterial efficiency, certified by precise lab test, is due to the **Nano inclusions present in the complex architecture of the multilayer coating**, which destroys the bacterial cell membrane by blocking its nutrition and interrupting the cell division cycle.

Thanks to the innovative production processes, ABACO is able not only to **completely inhibit the growth of bacteria but also to eliminate them**, guaranteeing a durable and perfectly hygienic surface.

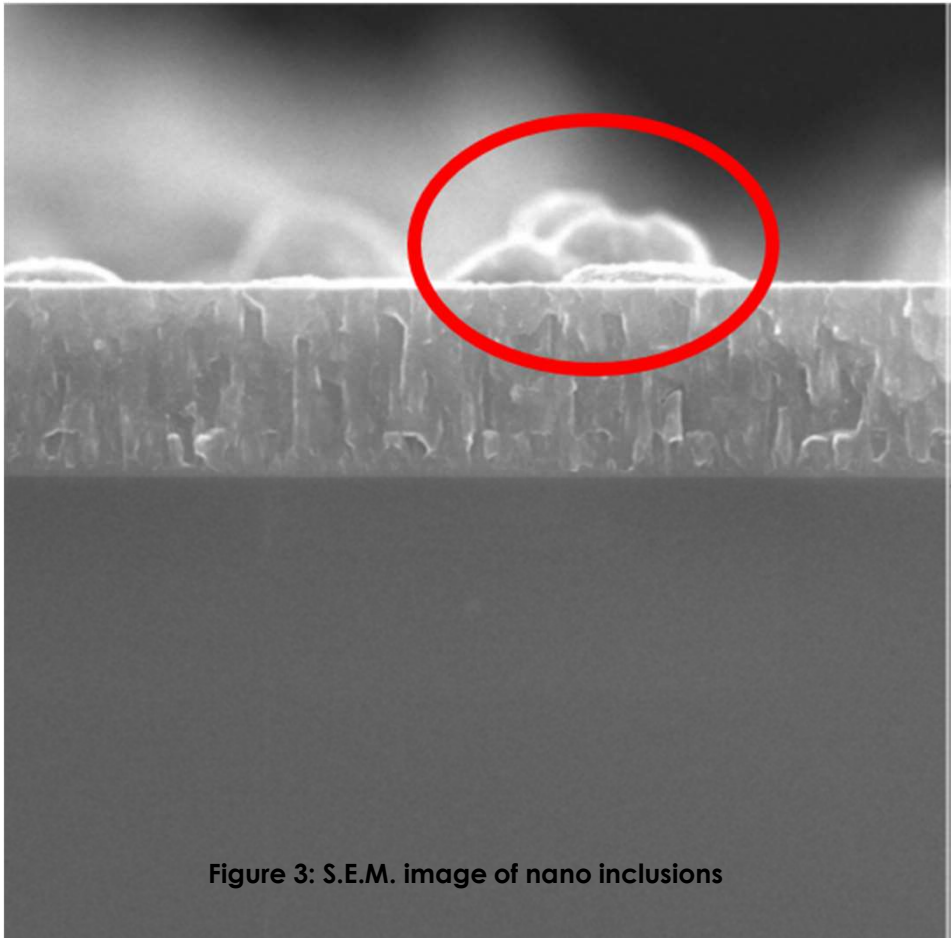


Figure 3: S.E.M. image of nano inclusions

ABACO is completely bactericidal

There are two processes that can be defined ‘antibacterial’:

BACTERIOSTATIC (means that the bacteria stops to reproduce itself, but it’s not completely eliminated)

BACTERICIDAL (means that the bacteria has been completely destroyed and it can not reproduce itself anymore)

The ABACO’s action is completely BACTERICIDAL. Tests demonstrate that the ABACO BACTERICIDAL effect is efficient already within an hour after being in contact with bacteria.

The ABACO’s antibacterial action continues throughout the active life of the object and improves over time.

The finish is **fully hypoallergenic**, also in accordance with DM and 3/21/1973 the coating has no cautions for daily use and is completely safe for human contact.

Test certifications

The test of scientific validation on ABACO coating were carried out by two precious institutions in this field:

1. AIN ASOCIACION DE LA INDUSTRIA NAVARRA-PAMPLONA (Spain)

2. DIPARTIMENTO DI MEDICINA MOLECOLARE E TRASLAZIONALE DELL' UNIVERSITÀ DEGLI STUDI DI BRESCIA (Italy)

Test method

The two institutions tested ABACO according to the reference standard JIS Z 2801 / A12012 (Japanese standard). This standard is the most rigorous and widely applied by the scientific community, and the International standard ISO 22196.

The methodology described in these two standards is conceptually very simple, in fact it is a comparison between some not treated samples (reference sample) and some samples treated after a precise time interval of 24 hours.

The procedure consist in determining a parameter named R, that permits to measure and quantify the antibacterial efficacy. The parameter R is defined as a logarithm of the relation between the medium value of the bacteria cells on the not treated sample after 24 hours (B), and the medium value of the bacteria cells on the treated sample after 24 hours (A).

$$R = \log \frac{B}{A}$$

If R is major of 2 the activity of the coating is considered bactericide.

If R undertakes values between zero and 2 the activity of the coating is considered bacteriostatic.

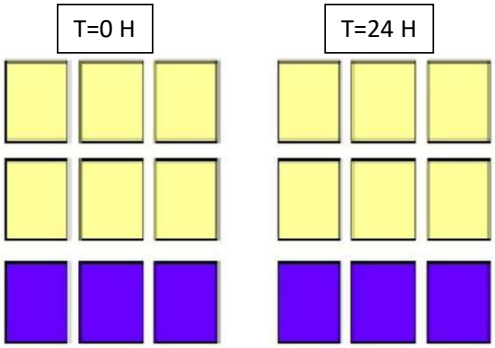


Figure 5: Test – in yellow the treated samples and in blue the reference samples

Test results:

- ABACO Stainless Steel:

Bacteria	R
S. Aureus	3,45
E. Coli	5,08

Table 1: values R for ABACO Stainless Steel

- ABACO Gold:

Bacteria	R
S. Aureus	3,725
E. Coli	4,409

Table 2: value R for ABACO Gold

Available ABACO coatings

MEPRA is at work to certify the major number of ABACO coatings in way to be able to supply the whole colour range as soon as possible.

For the moment it is possible to produce three coatings:

- **ABACO Stainless Steel**
- **ABACO Oro (Gold)**
- **ABACO Oro Nero (Black gold)**

For all these three coatings the certified R value is major than 2

In addition for Bronzo (Bronze) we have the Brescia University's certification and soon it will be possible to add this colour in the ABACO range too.

Why we present the ABACO coating as ‘bactericidal with unlimited durability’?

The antibacterial action continues throughout the active life of the object and improves over time, due to the physical properties of the coating.

This effect can be explained by:

- Uniformity

- Homogeneity

of the doping effects of the entire thickness of the coating. The GD OES(Glow Discharge Optical Emission Spectroscopy) analysis shows that the concentration of doping elements, that confers the antibacterial properties, is kept on the surface even after a long usage period of the objects.

Why we present the ABACO coating as ‘bactericidal with unlimited durability’?

On the figure 8 is shown the comparison between the concentration of doping elements (silver), alongside the whole thickness of the coating before and after the use of a sample treated with ABACO.

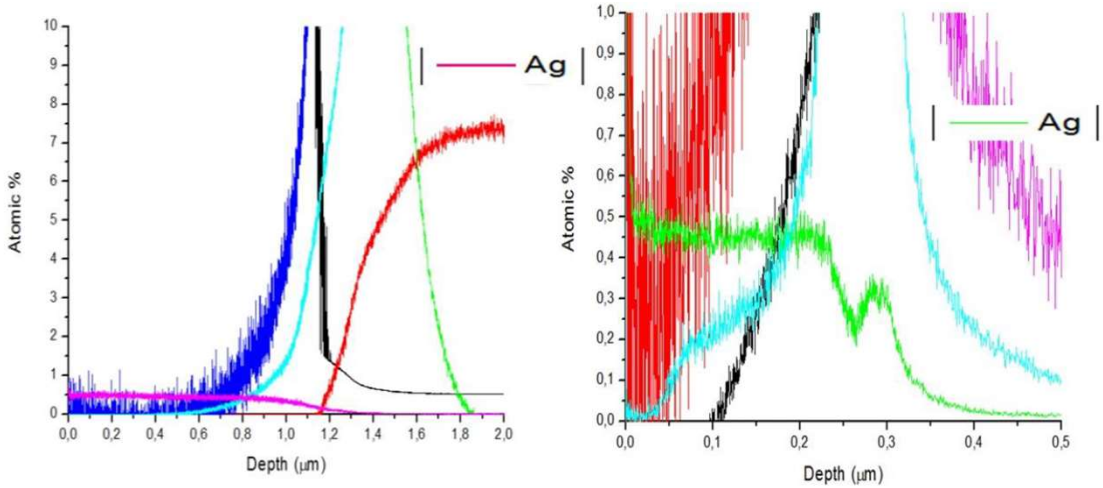


Figure 8: Comparison between the silver concentration alongside the thickness of the coating of a not used sample, on left, and the concentration of silver alongside the thickness of the coating on the same sample after the use, on right.

Competitors of ABACO

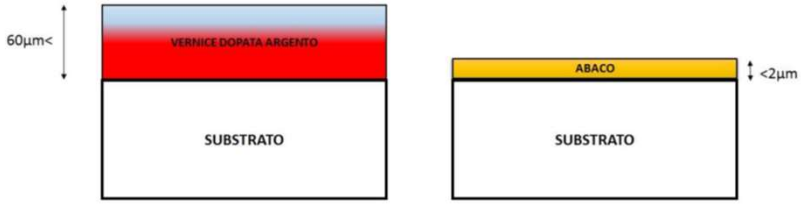
In the past years and still today, many antibacterial coatings have been released on the market: they are all varnishes.

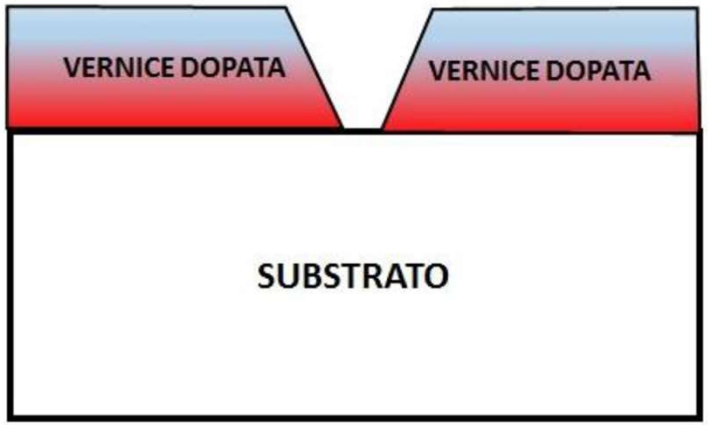
No varnish can guarantee a real antibacterial effect.

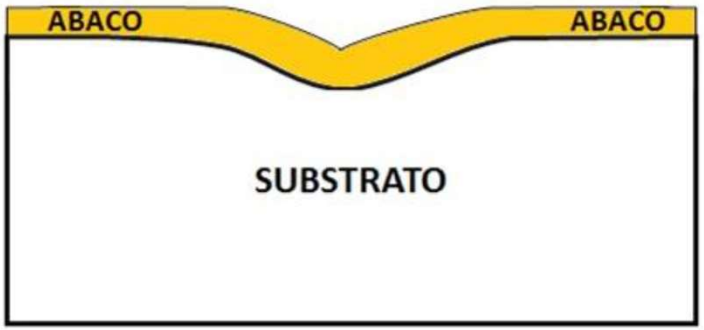
Because of:

1) Doping material's stratification

-2) Absence of antibacterial action, if not elevated thicknesses are applied







Competitors of ABACO

3) No guarantee of durability in time

It is easy to understand that the activity of the antibacterial varnish is guaranteed until the film is entire: a simple scratch (impossible to have on PVD coatings) compromises every antibacterial activity and, in contrary, can generate a high concentration of bacteria on the scratched part of the object.

Why to choose products with ABACO?

The world we knew since few weeks ago does not exist anymore

We'll all be scared to be in crowded places after this, imagine to eat in a place with a lots of people…

The entire HORECA industry will need to rethink the operation models in order to guarantee the client's feeling to be in a safe and a healthy place

The antibacteria and disinfection issues will be on the top in restaurants, buffets, room service etc.

ABACO can be a part of the solution to a safer world

How much ABACO costs?

ABACO everlasting antibacterial coating can be applied on any MEPRA product

The prices can easily be calculated:

ABACO Stainless Steel costs like the actual MEPRA products in Oro (Gold) +20% on the pricelist	ABACO Oro (Gold) costs +20% more than the Oro (Gold) without ABACO on the pricelist	ABACO Oro Nero (Black gold) costs +20% more than the Oro Nero (Black Gold) without ABACO on the pricelist

The future starts today

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