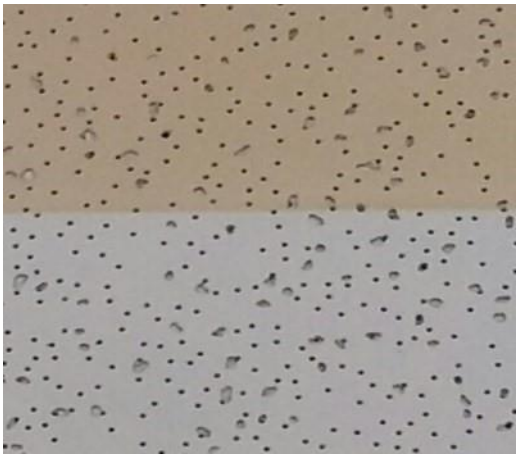
<u>Manufacturer's</u> comments: **Mechanism** of preventive effects of **photocatalytic** surfaces created by special **coatings Protectam FN® against** the establishment of **microorganisms** with regard to the Biocide Act **(324/2016 Coll.)**

Physical antibacterial effect:

Protectam FN® coatings are mineral **water suspensions forming an inert** composite coating with special morphology optimized for the protection of outdoor surfaces and air purification.

The coating layer contains titanium dioxide with a small addition of inert mineral binders with which they form an insoluble inert composite. According to iso tests carried out by the TZÚS, the coating layer created has a surface hold of 3MPa/cm^2 on average. These properties guarantee a long service life (decades) in indoor and outdoor use and minimal release into the environment.

The morphology **of** the **coating layer with** a high **microalphletremoval :** Morphology of the FN® layer was designed for the purpose of the maximum removal of molecules and microscopic particles including viruses, bacteria and other **microorganisms** from the air and there is a fixation of them in the coating layer. In Figure 1. **we see** an **enormously** higher cigarette smoke draw on the FN-treated side® (top), compared to the normal interior colour (bottom).



This **feature** of **the cellared microporous** structure **physically** captures not only molecules**,** but also **microparticles** and **micro objects**, including **viruses and bacteria.**

Fig.1 Ceiling plate painted in the upper half of the FN® paint. The experiment took *place for 3* months in the *smoking room and the surface has* not *been illuminated by UVA light.*

Isolation and starvation of **microorganisms**: There are no nutrients in the coating **and,** in addition, microorganisms are negatively affected by a very effective drying effect based on the high-surface character of the material. Captured **micro-organisms are isolated in this environment,** without **nutrients and cannot reproduce.**

Photocatalytic effect-jump electron: **If** ultraviolet light is present, captured molecules and microorganisms are exposed to the **energy action** of free **electrons and electron** holes with an energy **of 3,2 eV**. This energy is higher than then energy of most bonds between atoms in organic molecules substances. As a result, these bonds are broken and air oxygen binds to their place. However, as can be seen from the same experiment in the smoking room (Fig.2), when the ceiling plate was illuminated by a UVA on the active layer, decompose without the contribution of any chemicals, only by the effect of electron jump between smoke molecules and TiO_2 and subsequent connection of oxygen in the air to broken bonds .

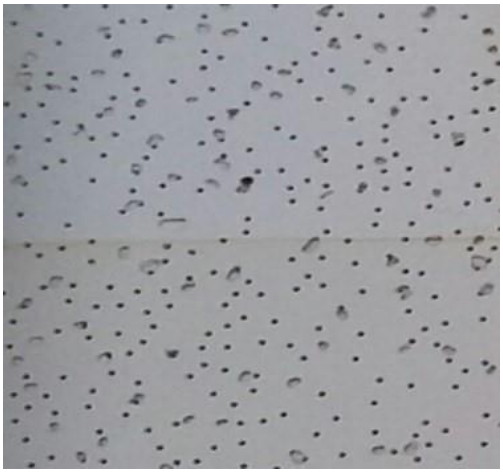


Fig.2 Ceiling plate painted in the upper half of the FN® paint. The experiment took *place for 3* months in the *smoking room and the surface was illuminated by UVA light.*

The experiment took place at a relative humidity o about 10%, in which the mechanism of action of free radicals is completely excluded.

In this way, microorganisms are also disposed of only after the complete distribution of the remains of their dead bodies (plaque).

Antimicrobial barrier: The **structure** of the layer and its morphology with a pore size below **5nm** also acts as **an antimicrobial** barrier against the penetration of fungi and **fibrous fungi .** Although FN mold® can kill the coating , the coated layer will not release mold. Mold spores on the surface of the coating are insulated and gradually perish at the top as indicated above.

The mechanism of antimicrobial action of Protectam FN® coatings is purely physical ***in nature and the effect of free radicals ,possibly formed in the presence of water , is negligible. No chemicals*** are involved in ***this photocatalytic process .***

Chemical biocide effect:

Advanced Materials-JTJ s.r.o. registered and launched the biocide **product Protectam FN®1 Biomax in 2017.** This medicine contains zinc pyrithione as an active biocide substance. It is designed for both medical facilities and protection of facades and walls against microbiological infestation .

Its advantage is to save one technological step in the treatment of the façade , where the creation of a photocatalytic protective layer as well as chemicals treat the façade takes place at once in one application.

This product uses chemical biocide effects and **is covered by the Biocide Act (324/2016 Coll.).** Before using it It is necessary to read the instructions carefully and use only in the intended way.

Conclusion:

The photocatalytic effect is the opposite of selective chemical killing of bacteria by toxic substances – biocide. Photocatalysis is perfectly environmentally friendly and can greatly reduce and partially replace the widespread use of biocide today. Limiting, replacing and destroying biocide using photocatalysis is the basic orientation of the company.

We see the use of biocide as necessary where more environmentally friendly means cannot be used, or there is significant savings in work and energy, such as in the case of Protectam FN®1-Biomax for façade renovation.

If it is the manufacturer Advanced Material-JTJ s.r.o. does not explicitly state for the product, the products are not covered by the Biocide Act (324/2016 Coll.).

In Kameny Žehrovice 29.9.2017

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