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## NANOTEXTILES FOR ANTIBACTERIAL AIR FILTRATIONS

### RESEARCH/TECHNOLOGY INTRODUCTION

Within the Ústí Material Center, we are focused on the preparation and research of nanofibrous textiles, which, thanks to nanopores, serve as very effective barrier for bacteria and some viruses. A big problem of filter media is their clogging by bacteria and microorganisms - the so-called biofilm formation;

The resulting biofilm significantly reduces the filtration efficiency and usability of the filter material. Therefore, we try to modify these membranes with antibacterial additives, which prevent the formation of biofilm and at the same time eliminate the emerging bacteria.

### POTENTIAL USERS

Manufacturers of protective masks, respirators, air filters in very clean rooms, etc. Manufacturers of automobiles (eg cabin filters for cars).

### ADVANCEMENT OF TECHNOLOGY AND MARKET APPLICATION

We have developed antibacterial filter materials based on polymeric nanofiber textiles, on which there was no accumulation of bacteria. We modify nanofiber textiles based on nylon 6 and PVDF with antibacterial additives such as dodecyltrimethylammonium (DTAB) and chlorhexidine. The antibacterial activity of the filters was confirmed by testing on a number of microorganisms and also the stability of antibacterial activity after the air filtration test was confirmed (see figure).

### ADDITIONAL INFORMATION

Patent: CZ 306831 B6, The technology was developed in cooperation with Nanovia s.r.o. Litvínov.



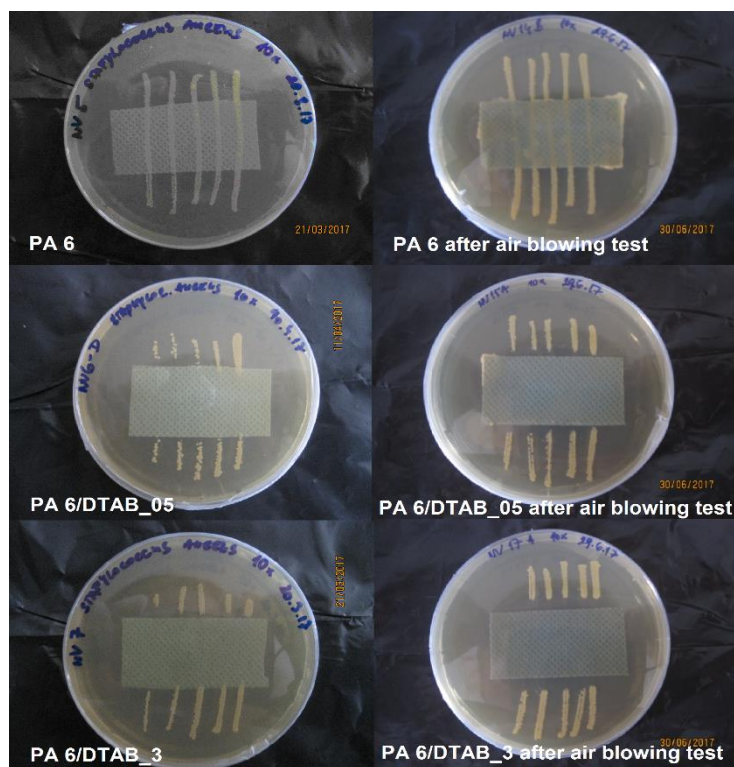


Figure 1: Tests of antibacterial activity against the bacterium *Staphylococcus aureus* applied in five strips by below the sample of nanotextile before (left) and after (right) air filtration. Top pure nylon PA6 showed no antimicrobial activity, middle PA6 modified with 0.5% DTAB and bottom PA6 modified with 3% DTAB are antibacterially active. It is shown that the samples retained antimicrobial activity even after the filtration test.

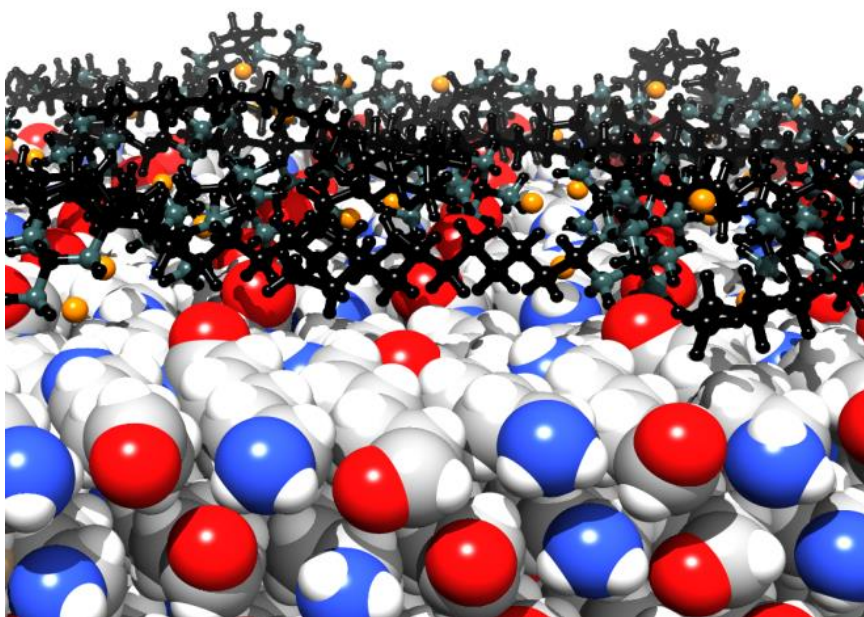


Figure 2: The surface of DTAB nanofibers modified with DTAB imaged using the computer modeling method.