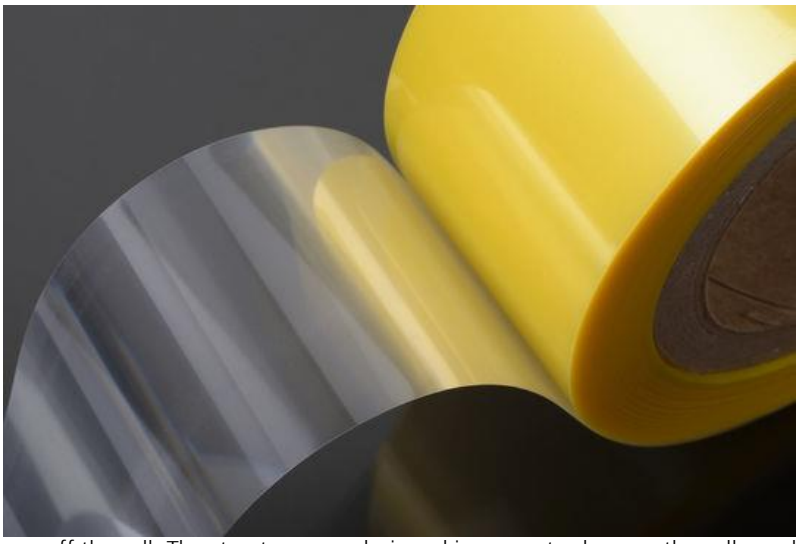
Quelle: Kunststoffe, 27.04.2017

Nano Structures to Stifle Bacteria

Roll-to-Roll Production of Large-Surface Anti-Microbial Films

Each year, roughly 2.6 million Europeans become infected with germs in hospitals; almost half of them die. Despite a sterile environment, there is a vast number of breeding grounds. Large-surface anti-microbial films are due to prevent bacteria from settling on surfaces. In an EU project, scientists develop the first roll-to-roll production system for this purpose.

Starting from bed rails, folding tables, telephones and alarm buttons up to furniture, door knobs or water taps: Bacteria can be found in many places in a hospital. They can lead to life-threatening infections, especially for vulnerable patients. Within the scope of the "Flexopol" EU project, an international project consortium headed by the Fraunhofer Institute for Production Technology IPT, Aachen, Germany, develops a production system to apply anti-microbial surface structures to a large surface area of plastic films, in a cost-efficient process. The combination of material and surface structure is due to kill germs with up to 99% efficiency, and inhibit their growth.



Microstructured surfaces off the roll: The structures are designed in a way to damage the cell envelopes of the microbes mechanically, to kill off pathogens (© Fraunhofer IPT)

This project is aimed at setting up a pilot line to produce affordable anti-microbial films for those surfaces patients get in contact with most frequently. By significantly reducing the risk of contamination, these films protect the health of patients, as well as medical staff – according to the high standards of hygiene in medical environments. There is also a benefit included in terms of economics, because the cost of cleaning and disinfecting agents are reduced.

Nano Structures to Prevent Diseases

The projects starts from the material formulation: Nano capsules are added to a polypropylene basic material which is then extruded into a thin film. The nano capsules include vegetable oils that act as antimicrobials. In a hot embossing process, the films are given nano structures that impede the adhesion of bacteria or fungal spores by mechanically damaging the cell envelopes of the microbes and killing off pathogens.

In a pilot plant, Fraunhofer IPT includes the film material, embossing tools and the instruments used to monitor product qualities. The challenge is to apply the anti-microbial surface structure to the film material, over a large surface and without seams, and to transfer the film production process into a process that is serviceable under real industrial conditions.

Donostia University hospital in Spain and the laboratories at Minho University in Portugal, examine and evaluate the new films for suitability and efficiency. The idea underlying is to completely cover hospital walls and grounds with these films in order to minimize contamination with microbes over large areas. Later on, other branches, in addition to the medical sector, are due to benefit from these anti-microbial films, for example food industry, producers of means of public transport or the sanitary area.

The „Flexopol" EU project is scheduled to run from January 2017 to December 2019. Over this period, Fraunhofer IPT will be in charge of project co-ordination. The European Commission supports the project in the framework of the Horizon 2020 funding program, with a grant of EUR 5.17 mil. Total costs are EUR 5.68 million.

Research institutes and industrial partners involved:

- Fraunhofer Institute for Production Technology IPT, Germany
- IK4-Tekniker, Spain
- Granata Design Ltd., Great Britain
- Universidade do Minho, Portugal
- Asociación Instituto Biodonostia, Spain
- Institut Català de Nanosciència i Nanotecnologia (ICN2), Spain
- Propagroup S.p.A., Italy
- Universidad de Alicante, Spain
- Celanese SO.F.TER, Italy
- Naturality Research and Development SL, Spain

Quelle: http://www.kunststoffe.de/en/specialized-information/technology-report/artikel/nano-structures-to-stifle-bacteria-3435132.html?et_cid=3&et_lid=3&et_sub=technology-reports