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Antibacterial Coatings on PET Films and Non-wovens by Aerosol-Atmospheric Pressure Plasma

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Polyethylene terephthalate (PET) can be used for a variety of purposes, e.g. for food and beverages photographic films, or as fibers/non-wovens. Each application requires particularly high demands on material surfaces with inhibiting effects on bacterial or fungal growth. Preventing the microbial colonization on the technical surfaces is important to preserve the product quality of packaged goods, film resolution quality and well-being when wearing functional clothing (odor formation) or general hygiene requirements. Nowadays, the bulk properties (e.g. mechanical, optical) of materials in the specified applications have been optimized. Antibacterial thin coatings, which do not affect bulk properties, have therefore become a very active field of research, due to identifying alternatives to the traditional application of biocides. Currently there are three major strategies for tailoring antibacterial coatings: antibacterial agent release, contact-killing, and anti-adhesion/bacteria-repelling.

The aim of this study is to reduce the microbial growth on PET films and also non-wovens by deposition of nm-thin antimicrobial coatings applying the aerosol-atmospheric pressure plasma technology. Depending on process parameters (current and velocity), plasma polymer-like coatings of octenidine, chitosan, chloro-hexidinbis (D)-gluconate and sulfobetaine methacrylate were prepared on a PET-GAG type film (150 µm, Folienwerk Wolfen GmbH). The surfaces were characterized spectroscopically (FTIR, XPS), morphologically (profilometry, REM) as well as concerning their surface energy. The microbiological properties were tested based on standardized microbiological tests and compared to a commercial PET film with antimicrobial properties designed by Ag Nanoparticles. Additionally the studies focused on the evaluation of a fast test procedure to characterize the antimicrobial efficiency on the basis of fluorescence intensity of *Pseudomonas fluorescens* (GFP) bacteria.

Keywords

aerosol-atmospheric pressure plasma
antimicrobial
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PET