

Obtention of bactericidal textiles by post-discharge plasma

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Abstract

A major growth concept over the last five years has been the introduction of the concept of durable freshness applied to all kinds of textile apparel. The growth of bacteria on the perspiration entrapped into a garment can rapidly lead to the buildup of undesirable odours. In addition, in the field of medical textiles it is of interest to avoid bacterial growth on fabrics. Antimicrobial finishes inhibit or preferably kill micro-organisms by a number of different mechanisms that act around the cell wall of the micro-organism. Many chemical approaches have been used to obtain antibacterial textiles. However, environmental constraints lead to the use of environmentally friendly methods such as low temperature plasma.

Fluorine widely is known as antimicrobial agent, and is used in many everyday products. Fabrics treated with fluorine-containing gases may be interesting both for their possible anti-bacterial properties as well as for their water-repellency properties.

In this paper we evaluate the effects of fluorine-containing post-discharge plasma on different textiles (cotton, wool and polyamide 6). A blend Ar-2%CF₄ was used as plasma gas. The species present in the plasma were evaluated by Optical Emission Spectroscopy. The surface properties of the fabrics were evaluated by Static contact angle, X-ray photoelectron spectroscopy, Scanning electron microscopy and Atomic force microscopy. The antibacterial activity of wool, cotton and polyamide 6 fabrics was tested qualitatively and quantitatively against different microorganisms by standard methods (*Escherichia Coli*, *Staphilococcus Aureus*, *Bacillus Subtilis* and *Candida Albicans*).

The three materials studied show different behaviour; while treated wool and polyamide 6 show antibacterial properties against some of the microorganisms studied, cotton is inactive in all cases. This feature of the treated fabrics has been correlated with the surface properties analyzed by the abovementioned methods.