

SUMMARY

This paper is based on the study of the antibacterial properties of the thin films of amorphous (a-C) and amorphous hydrogenated carbon (a-C:H), developed by magnetron sputtering techniques on a polymeric membrane substrate PET, 50 μm thick.

It must be clarified that the antibacterial action of the thin films under study has not to do with their bactericidal action, but with the examination of the effect of their presence to the degree of the bacteria's adhesion in connection with controls of non-coated PET. The objective is to prepare thin films based on carbon, which will avert the bacterial adhesion, thus contributing to the prevention of probable superinfection.

It must also be mentioned that this paper is drawn up within the scope of a wider research of amorphous carbon thin films that is conducted by the laboratories of the Department of Physics (and concerns mainly the study of their optical and mechanical properties) aiming to the deep comprehension of their probable properties and applications.

In the beginning, a brief discussion is quoted concerning the achievements of the scientists throughout the world in this specific research field.

An introduction follows on the thin films a-C and a-C:H, which is deemed necessary for the completeness of the presentation, while the data that resulted from the study of the optical properties (structural "identity") of the a-C and a-C:H thin films are also cited, being studied in this paper [1].

Then, there is certain basic knowledge of biological interest about the bacteria that were examined by this paper, aiming to the reasoning of their selection among others and the pointing out of the differences that they present at the various stages of the study. The theoretical introduction ends

with the description of the technique of atomic force microscopy (AFM), as it consisted of a "tool" of topographical characterization and clarification of the mechanism by which the bacteria are adhered on the surfaces of the thin films under study.

The experimental part follows, which is divided into three units.

The first unit describes the procedure of preparation of the samples under examination. This unit plays an important role for the continuance of the particular research field, as there are important information and observations for ensuring the maximum possible accuracy.

The second unit examines thoroughly the bacterial adhesion on the, under study, surfaces of the thin films a-C and a-C:H that have been developed on PET. We present the conclusions that resulted from all the experimental series that were carried out and all the possible information is noticed, which may arise from the partial experiments, as well as the total results of this particular part of the project.

The third unit cites the study of the surfaces by AFM. The study concerns the drawing out of topographical data of the thin films, as well as of the bacteria that were used. It aims to the examination of the way of the thin films effect to the extent, as well as the adhesion mechanism of the bacteria, having as an ulterior objective the possibility of designing and composing C coats with the desirable antibacterial properties. We also mention the result of the efforts that were made aiming to the quantitative, as well as the "qualitative" count of the adhesion strength of the bacteria on various surfaces.

This project ends with the conclusions and suggestions for future steps in this specific research field.