

Chapter 6

THE PROPERTIES OF COTTON TEXTILE DEPOSITED BY COPPER AND SILVER USING MAGNETRON SPUTTERING COATING TECHNIQUE

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INTRODUCTION

Two important parameters which are the production of hierarchical surface structures (micro/nano-scale roughness) and low surface energy layer are needed to obtain hydrophobic surfaces from hydrophilic surfaces ⁽¹⁾. In these hydrophobic surfaces, air pockets trapped under the water drops causing a reduced contact area between the surface and drops leads to increased macroscopic contact angle ⁽²⁾. An important point in the plasma coating by sputtering technique on the textile is the level of adhesion of the deposited metal film and wearability of the resulting fabrics. In this work, structural and morphological properties of cotton textiles with Cu and Ag film deposited by DC magnetron sputtering technique are investigated by using scanning electron microscopy (SEM), energy dispersive spectroscopy (EDS), abrasion and drop tests. Furthermore, a novel method called mass balance method is proposed to measure the thickness of these metal film coatings, and compared with the results obtained by means of SEM. There is a good correlation between those results.

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CONCLUSION

In this study, it was shown that cotton textiles coated by magnetron sputtering obtained multifunctional properties. In order to find the thickness of deposited Ag and Cu on textiles with respect to time, the glass samples were also coated with the same elements under the same conditions. Then, the thicknesses of depositions on glass samples were measured by both SEM and newly proposed mass balance method. The obtained results were found in good agreement with the ones obtained by SEM. SEM-EDS investigation proves that the thickness of deposition increases with increasing deposition time. Contact angle measurements have shown that the Ag coated cotton textiles become more hydrophobic than the Cu coated cotton textiles. SEM investigation of Ag deposited textiles revealed that the surface deformation after abrasion test for 5000 cycles, leading to the loss of hydrophobicity. In order to get better hydrophobic properties, the adhesion of Ag to the textile can be improved by special resins.

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