COMPARISON OF GOLD LAYERS PREPARED BY SPUTTERING AND VACUUM EVAPORATION

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Surface morphology of continuous and discontinuous gold layers of increasing thickness was studied using atomic force microscopy (AFM). Layers were prepared on polyethyleneterephtalate substrate by sputtering and vacuum evaporation. Changes in character of gold layer surface as a function of sputtering time was observed by AFM technique. Electrical resistance of deposited gold layers was measured as a function of deposition time. It was determined when sputtered and evaporated gold layers became continuous and homogenous. It was observed, that vacuum evaporated gold layers became homogenous later than sputtered ones. Differences in values of electrical resistance for layers of the same thickness was also observed.

Key words: *polymer, metal layer, gold, sputtering, evaporation*

1. Introduction

Metallization of polymers plays nowadays important role in electroengineering and chemistry of surfaces. Metalized polymer films (from one or both sides) are widely used in industry ranging from food packaging to biosensors [1–4]. Structure of the formed metal layer is mainly influenced by the nucleation processes [5, 6]. Zaporojtschenko, e.g., had studied the different aspects of metal/polymer interface formation [7]. The polymeric films metallized from both sides are basic structures for construction of diodes with negative differential resistance [8] and light-emitting polymer based diodes in optoelectronics [9].

Metal layer can be prepared on the polymer layer by sputtering, vacuum evaporation, as well by electrochemical procedures [4, 8, 10]. Microscopic theory of nucleation processes for sputtering and vacuum evaporation was suggested by Walton [11]. It desribes gradual growth of a continuous metal layer. There are two problems, when a metal layer onto a polymer is formed. It's adhesion of metal to the substrate and, when the metal film is too thin (usually under 10 nm), measuring its thickness. It is possible to increase adhesion of metal layers to the polymer by various methods, including laser and ion beem irradiation [10].

This work studies growth of gold layer onto polymer from discontinuous to continuous one. The structure of the islands and metal films was characterized by the AFM technique. To measure such thin metal layers AAS and UV-VIS spectroscopy was used. Continuity of gold layers on the polymer surface was investigated by measuring its electrical resistance [4].

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