Tin/n-hexane nanocomposite films and their electrical properties

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Introduction

Nanocomposite films metal/dielectric were studied in the second half of the 20th century. Later metal/polymer and metal/hard carbon (C:H or a-C:H) composite films were also considered. In recent time, magnetron DC and RF sputtering from a metallic target in a working gas mixture of argon and active (hydrocarbon) gas were used to deposit metal/hydrocarbon nanocomposite films.
Nanocomposite films of metal (or metal oxide) embedded in plasma polymer matrix represent a class of promising materials. The main research attention has been paid to their attractive electrical and optical properties.
We investigated the relationship between electrical properties of tin/plasma polymer nanocomposite films and the deposition parameters and structure. Experimental results are compared with the computer simulation.

Experimental

The nanocomposite layers (tin in plasma polymer matrix) were prepared in a stainless steel vacuum chamber. RF powered magnetron with tin target was used to excite the discharge and to activate the monomer species. Working gas mixture was consisting of Ar and n-hexane vapours. The deposited films were characterized by several methods: AFM, TEM, Electron tomography and XPS. Current-voltage characteristics were measured to examine the electrical properties of the layers and their dependence on the deposition parameters.
The TEM and Electron tomography was employed to allow comparison of the layers with models. The computer experiments were done by self-made software analytical tools.

References

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