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Abstract

TITLE: Structure and optical properties of the amorphous hydrogenised carbon films modified by titanium and silver
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ABSTRACT BODY:
Abstract Body: In the present report structure and optical properties of the amorphous carbon films with titanium and silver impurity (a-C:H <Ti, Ag>) are shown and discussed. The films were prepared on the amorphous quartz and NaCl substrates using the method of magnetron sputtering of the combined target, which is consisted of polycrystalline graphite together with titanium and silver. Argon and methane gas mixture was used as a working gas. The gas pressure was stabilized at 0.9 Pa , substrate temperature was kept at 50^{o}C. Silver and titanium concentration in <Ti, Ag> films was changed by alteration of Ag and Ti area to that of graphite in total target. Metals content in the films was varied from 0 to 2.64 at. % in case of titanium and from 0 to 4 at. % in case of silver and was determined by SEM Quanta 3D.
Raman spectroscopy (Ntegra Spectra) was used to study the films' structure. Investigations showed significant increase of an impurity influence on the a-C:H matrix. AFM research (Ntrgra Terma) revealed presence of clusters on the surface of the film with a characteristic size – 30 nm.
More detailed study of the films by TEM (JEM 2100 JEOL) showed that films have a complicated structure: a titanium impurity reinforce the matrix of a-C:H and a silver impurity embedded in the way of clusters with a size from 3 till 60 nm, namely clusters from 3-10 nm are the majority.
In optical absorption spectra of a-C:H <Ti, Ag> films the absorption peak in the range from 474 till 532 nm was found. The intensity of the peak rose with an increase of Ag concentration. It is supposed, that peak is a result of surface plasmon resonance of silver clusters in the films.
Thus, opportunities of modification a-C:H films by silver and titanium impurities are shown in this work.