ABSTRACT BOOK

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PLENARY INVITED SPEAKERS

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Features of the structure and optical properties of thin TiO$_2$<Ag$>$ nanocomposite coatings

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The structure and optical properties of nanocomposite coatings based on titanium dioxide and silver nanoparticles (TiO$_2$<Ag$>$) were studied. Nanocomposite films were obtained by ion-plasma high-frequency sputtering of a combined target TiO$_2$ (rutile)+Ag. The structure of TiO$_2$<4.2 at.% Ag$>$ coatings (figure a) is an amorphous TiO$_2$ matrix with embedded isolated spherical silver nanoparticles 3-4 nm sized.

In the TiO$_2$<Ag$>$ nanocomposite coatings silver impurity changes the position of the transmission edge in the optical spectra and reduces the transparency of the coatings. At the same time, in the visible region of the spectrum in the range from 400 to 500 nm there is a minimum transmittance (figure b) that is due to the resonance absorption of electromagnetic radiation by the surface electrons of silver nanoparticles (plasmon absorption).

Morphology and electron diffraction pattern (a) and transmission spectra (b) of TiO$_2$<Ag$>$ nanocomposite coatings

Thus, the structure of nanocomposite TiO$_2$<Ag$>$ coatings represents an amorphous matrix TiO$_2$ with inclusions of isolated silver nanoparticles. In these coatings resonance absorption in the visible region of spectra is manifested, and the intensity of the resonance absorption increases with silver content rise.

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