

Nanostructured surfaces

AlN nanostructured films on thermolabile polymeric films for protecting coatings from IR radiation

**A. Shapovalov¹, I. Korotash¹, E. Rudenko¹, L. Osipov¹, D. Polotskiy¹,
Z.Tsybrii², A. Golenkov², F. Sizov²**

¹ *G.V. Kurdyumov Institute for Metal Physics, NAS of Ukraine, 36 Academician Vernadsky Blvd., 03680, Kyiv, Ukraine, phone/fax: +380 44 424 3432,*

² *V. Lashkaryov Institute of Semiconductor Physics, NAS of Ukraine, 41 Nauki Ave., 03028, Kyiv, Ukraine, phone/fax: +380 44 525 6296,
E-mail: tsybrii@isp.kiev.ua*

Aluminum nitride (AlN) nanostructured film coatings have been obtained by a new technique of hybrid helikon-arc ion-plasma deposition. Possibility to combine magnetic-filtered arc plasma deposition technique with a treatment in RF plasma of helicon discharge allowed deposit AlN coatings on thermolabile substrates, significantly increasing the deposition rate. A study of spectral properties of AlN nanostructured films (reflection and transmission spectra in the range of 2–30 μm) has been carried out by using the infrared Fourier spectrometer Spectrum BX-II. Structure properties of the films grown were studied by XRD and scanning probe microscopy methods were obtained and revealed a dense developed film surface structure, which is typical for the condensation under significant bombardment of growing condensate by high-energy particles of plasma. Round-shape nanosized grains are distributed uniformly over the tested areas and the average height difference between adjacent grains is 1.5...2.5 nm.

The results obtained from the study of IR reflection and transmission spectra and also in sub-THz range have shown that such thermolabile polymeric films with AlN nanosize grains coatings can be used for suppressing the noise level from the background IR radiation in the range of 7.5 to 25 μm to improve characteristics of sub-THz and THz receivers. Also such AlN coatings on thermolabile polymeric films are applicable for perceptibility decrease of the objects radiation in the same spectral range.