

Optical Properties of Vacuum Condensates Manufactured by Oblique Deposition

Ovcharenko O.P.¹, Gaman D.A.², Bilozertseva V.I.², Khlyap H.M.³

¹*V.N. Karazin Kharkov National University, Kharkiv, Ukraine*

²*National Technical University “ Kharkiv Politechnical Institute ”, Kharkiv, Ukraine*

³*University of Technology, Kaiserslautern, Germany*

Needing fabrication of new materials and wide range variation of their properties stimulates appearing of big number of theoretical and experimental works devoted to studying new thin-film coatings with different structural perfectness. The porous optical layers allowing variation of the refractive index in the range $n = 1.05 \div 1.08$ are of particular interest.

This work reports optical and structural characteristics of porous coverings obtained by thermal evaporation in vacuum ($P < 5 \cdot 10^{-4}$ Pa) under oblique incident beam (angle to the normal of glass substrate is $\approx 70 \div 80^\circ$). Optical transmission of condensates is examined in the range 300 ÷ 1200 nm. Numerical working-out of experimental results allowed determining optical constants of the samples and their dispersion [1]. The microstructure and porosity of the coverings and their connection with optical characteristics are also investigated.

The oblique deposition in vacuum has a disadvantage: the film is deposited inhomogeneously on the substrate surface. It happens due to different distance of the substrate surfaces from the evaporator and various angles of incident substance flows. We also have studied effect of inhomogeneous thickness and optical properties of separate layers on characteristics of bilayer enlightenment covering.

We showed a possibility of manufacturing interference layers with variable properties necessary for optical enlightenment of different optical devices.

1. Ovcharenko A.P., Duong Thi Nhu Tranh, Rakitin I.I., Gaman D.A. Numerical method of determining optical constants and thickness of thin films // Physics and technology of thin films and nanosystems. Proceedings of XII International Conference. – V.1. – May 18 - 23, Ivano-Frankovsk, 2009. p. 219-221.