THE EVOLUTION OF OPTICAL COATINGS: FROM ONE-DIMENSIONAL TO TREE-DIMENSIONAL PERIODIC STRUCTURES

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During standard physical vapor deposition methods, the substrates are placed in constantly rotated holders to average out the deposition angle and vapour flux intensity to form homogeneous isotropic multilayer coatings. For the formation of interference coatings, the variation of films optical constants is used by combining different materials with high and low refractive indexes (Fig. 1a). During the glancing angle deposition (GLAD) method, stationary placed substrate`s orientation can be angle-tuned according to the vapour flux in order to form nano-structured anisotropic layers (Fig. 1b) by evaporating amorphous thin films. Even more complicated 3D structures for various applications can be accomplished by depositing layers on periodically patterned substrates, i.e. gratings (Fig. 1c).

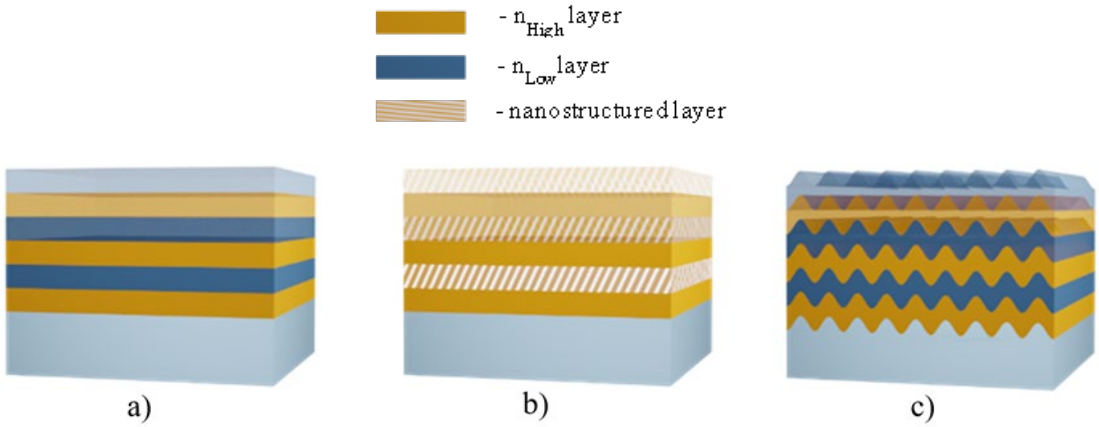

Fig. 1. The principal scheme of: a) standard isotropic multilayer coating, b) nanostructured multilayer coating, c) nanostructured multilayer coating on pre-patterned substrate.

In the presentation, the evolution of optical coatings from one-dimensional to tree-dimensional periodic structures will be presented. The focus will be on two topics: i) anisotropic coatings for polarization control [1,2] and ii) the possibility to form the dielectric structures with periodic modulation of optical constants together with the application of angular filtering of light [3,4]. The investigation of different technologies for the single layer and multilayer coating deposition on nanostructured surfaces will be reviewed.

References

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