«Nanocomposites and nanomaterials»

Nanostructured changes of CN_x films by laser irradiation

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Investigations of the CN_x system are motivated by the possibility to synthesize new phases with new properties. This requires detailed searching research of nano-structuring processes to improve the chemical composition and structure of these materials, as well, as to obtain nanostructured composites. For this purpose, different modified methods can be used after initial growth processes. One of the most effective modern methods is a local laser annealing of film surface [1, 2].

In this paper, the influence of laser pulse action on the CN_x/glass system has been investigated. The dependences of morphological, optical and structural properties of the CN_x on the parameters of wavelength (λ) and intensity (I) of laser pulses have been studied. Radiation of the fundamental frequency (λ = 1.064 μm) in a free running mode (t_p = 150 μs) and a Q-switch mode (t_p = 10 ns), as well, as a second harmonic (λ = 0.532 μm, t_p = 10 ns) at the same conditions with using of YAG:Nd^{+3} laser were used.

The possibility and limits of laser correction of the CN_x nanostructured films were shown. The analysis of an atomic force microscope revealed the significant changes of the morphology of the CN_x film surface in the CN_x/glass structure. Laser intensity thresholds of the beginning of changes depending on the duration of the laser pulse and the correlation between angular characteristics of reflection polarization-modulation method and morphological changes of surface condition were determined.

1. *Badi N., Bensaoula A.* Laser-induced modification of carbon nitride thin films// Journal of Applied Physics.-2000.-**88.**-P. 7351-7353.
2. *Grigonis A., Marcinauskas L., Vinciunaite V., Raciukaitis G.* Modification of the amorphous carbon films by the ns-laser irradiation// Cent. Eur. J. Phys.-2011. N **9**.-P. 1344-1350.