

Specificities of adsorption properties of SiO₂ + Si, nano composites of multiwalled carbon nanotubes and polyvinyl chloride, polyethylene, foam polystyrene after laser radiation

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A non-destructive method for the technological control of the structure defects by measuring internal friction (IF) and E after laser radiation was developed. The study of influence of structure defects on damping of vibrations in Si + SiO₂ plates by the diameter of $D = 100 \pm 60$ mm and by the thickness of $h_{SiO_2} \approx 600$ nm, $h_{Si} \approx 400\ 000$ nm allows to estimate the degree of perfection of crystalline structure.

Effects of acoustic emission (AE) after nanosecond neodymium and ruby laser irradiation in fluid SiO₂ are investigated. The fusion depth as the result of relaxation of photothermal elastic strains ϵ_i at the large time $\partial T / \partial t = (55 \pm 10) \cdot 10^9$ K/sec and spatial $\partial T / \partial x = (1 \pm 2) \cdot 10^4$ K/sm temperature gradients on the SiO₂ surface was appraised $\Delta h \approx 10000$ nm [1]. The quantity of reflections $N = \tau / t \approx 0.2$ nsec/0.02 nsec = 10, approximately 10 times forward-back in specimen.

The crater fusion depth Δh at constant intensity I and laser irradiation time t is limited by the local heat-conducting and establishment of "time-equilibrium" distribution of temperature gradients ΔT perpendicular to the crater axis and along it.

Outcomes of an evaluation of dynamic characteristics interstitial atoms S_{ij} , vacancy V and O-complexes can be applied for account of a condition of an annealing with the purpose of deriving structural defects in SiO₂ + Si after laser radiation.

REFERENCES

[1] A.P. Onanko, M.P. Kulish, Y.A. Onanko. Conference Proceedings of 2012 IEEE international conference on oxide materials for electronic engineering (OMEE), Lviv, Ukraine, 81-82 (2012). DOI: 10.1109/OMEE.2012.6464790.

Topics

Session A. Physics of condensed matter and spectroscopy

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