Nanocomposites and nanomaterials

Mechanical properties of SiO_2+TiO_2+ZrO_2 and automated system of anisotropy visualization

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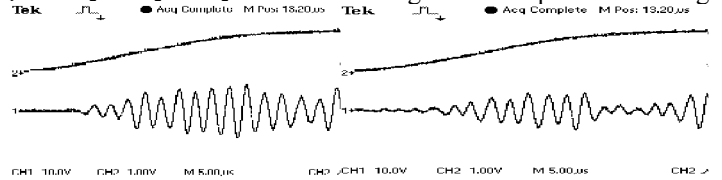
The influencing of ultrasonic deformation was researched on elastic and inelastic characteristics of nanocomposite based multiwall carbon nanotubes (MWCNT). Effects of acoustic emission (AE) under laser thermal-mechanical strains σ_i in SiO_2+TiO_2+ZrO_2 films are investigated and represented on fig. 1.



a **b**

Fig. 1. AE: a - Irradiation in SiO_2+TiO_2+ZrO_2 film with thickness h ≈ 1000 nm on Fe by the ruby laser λ = 694 nm by intensity I ≈ 10 MVt/sm^2; 10 V/p, 5 mcsec/p; b - irradiation by intensity I ≈ 5 MVt/sm^2.

The depth of fusion as the result of relaxation of thermoelastic strains σ_i at the large time $\frac{\Delta T}{\Delta t}$ = (55±100)·10^9 K/sec and spatial $\frac{\Delta T}{\Delta x}$ = (1±2)·10^4 K/sm temperature gradients on the surface was appraised Δh ≈ 10000 nm.

It contingently the presence of relaxation times τ, which characterize motion of structure defects. An electronic irradiation results to the increase of degree of crystalline and growth of elastic module E, shear module G, microhardness H ≈ $\frac{E}{10}$ of nanocomposites as a result of origin of additional connections which provide an interface on division border so due to sewing together of internal layers of MWCNT. The co-operation due to covalently forces of connection results to fixing of polymeric chains nanotubes and also migrations of radicals on traps.

The carbon nanotubes and polypropylene total deformation consists of elastic and inelastic constituents $\varepsilon_\Sigma = \varepsilon_E + \varepsilon_{IE}$. Inelastic deformation ε_{IE} is conditioned motion of dislocations. The increase of nanocomposite crystalline degree at growth of

MWCNT concentration, filling with the nanotubes of matrix results in the decline of content of well-organized phase.