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ESTIMATION OF TRANSITION TEMPERATURE TO DIFFUSION DEFORMATION MECHANISMS IN SINGLE-PHASE

BCC- HIGH ENTROPY ALLOYS OF EQUIATOMIC COMPOSITION 125

An analysis of the experimental data obtained by short-time indentation tests at temperatures from 20 to 900 °C of multicomponent single-phase high-entropy alloys of equiatomic composition with BCC crystalline lattice (BCC-HEAs) together with corresponding calculations allows formulating important conclusions.

There is a correspondence between sign of integrated enthalpy of mixture of elements for alloy ΔH (positive or negative) and homologous temperature of transition to diffusion deformation mechanisms $T_{hom} = T_{diff} T_{sol}$ (here T_{diff} and T_{sol} - absolute values of temperatures, respectively, transition to diffusion deformation mechanisms and solidus temperature of alloy). For alloys with $\Delta H = 0$ value $T_{hom} < 0,5$; for alloys with $\Delta H < 0$ value $T_{hom} \approx 0,5$, i.e. $T_{diff}/T_{sol} \approx 0,5$. This experimentally established ratio for alloys with negative integrated mixture enthalpy allows to calculate temperature transition to diffusion deformation mechanisms T_{diff} with use only one value - solidus temperature: $T_{diff} \approx 0,5 \cdot T_{sol}$. Thus value T_{sol} of an alloy can be determined not only experimentally, but also the way suggested in this work.

A value of temperature transition to diffusion deformation mechanisms T_{diff} represent actually a certain interval of temperatures, is lower which prevail dislocation deformation mechanisms, is higher - diffusion (p. 125-136; fig. 4).

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THE STRUCTURAL PROPERTIES OF THE LAYERS OF SILVER NANO- /MICROPARTICLES, SYNTHESIZED

ON THE SURFACE OF NUCLEAR FILTERS BY THE METHOD OF AEROSOL SPRAYING 137

A scientific and technical feasibility of the method of obtaining layers of nano-microstructured silver on the surface of nuclear filters by passing the aerosol nano-micro particles of silver through the pores of a membrane has been developed. Experimental samples of nuclear filters modified nano-microstructured silver have been prepared, and a study of structure of the layers of nano-microstructured silver by scanning electron and atomic force microscopy has been carried out. It is found that increasing of the silver particle concentration in the aerosols from $\sim 10^5$ to $4 \cdot 10^6 \text{ cm}^{-3}$ yields a change in the structure of the coating of nano-microstructures of silver from islet film consisting of isolated spherical silver particles ranging in size from 20 to 200 nm to the formation of solid fragments on the surface of the substrate of a thickness up to ~ 0.3 to $0.5 \text{ }\mu\text{m}$. It is concluded that the intense processes of coagulation of the silver nano- and microparticles deposited from the aerosol that leads to formation of silver nano-and microstructures of various shapes and sizes occurred on the surface of nuclear filters (p. 137-147; fig. 7).

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A COMPARATIVE STUDY OF FEATURES OF THE NANOSTRUCTURING SURFACE RELIEF

OF α - AND β -TITANIUM ALLOYS UNDER PULSED FEMTOSECOND LASER IRRADIATION 148

A comparative experimental study of the influence of femtosecond laser irradiation with various surface energy densities (0,74; 1; 2,5 J/cm² and the number of pulses ($N = 80, 400, 300$), wavelength $\lambda = 1030 \text{ nm}$ and pulse duration $\tau \approx 100 \text{ fs}$ on a change in the surface topography of low modulus titanium β -alloy Ti-26Nb-8Mo-12Z and nanostructured commercially pure δ -titanium VT1-0 was carried out using atomic force and scanning electron microscopy.

It is shown that quasi-periodic nanostructures with characteristics sizes of 0.4 to 0.8 microns are formed in the specimen surface as a result of the irradiation. For the titanium alloy, the nanolattice period decreases when the energy density increases; this value for the alloy is larger than that for pure titanium (p. 148-157; fig. 4).

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MODIFICATION OF CARBON FIBERS FOR REINFORCING PIPE POLYETHYLENE 158

Modification of carbon fiber surface was carried out via catalytic chemical vapor deposition technique. It was found that modified carbon fibers (MCF) are characterized by the surface area 25 times higher than that of original samples. Structure and morphology of carbon nanofiber layer were investigated using scanning and transmission electron microscopy.

It was shown that reinforcing pipe polyethylene with MFC leads to improve in physico-mechanical characteristics of polymer composite (both tensile strength and elastic modulus were increased up to 23 % and 34 %, respectively) (p. 158-167; fig. 5).

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TYPES OF DAMAGE OF WOVEN GFRP AND REPAIR OF LOW VELOCITY IMPACT DELAMINATIONS 168

A experimental study of ballistic impact on thin GFRP plates (plain glass fabric with epoxy matrix) with various velocities. There was designed and made a table-top facility for accelerating steel ball of a diameter of 8 mm up to 700 m/s by using energy of standard dowel hammering cartridge. There were observed crosscutting damage at high velocity impact and delamination with minimal damage of outer layer fibers at low velocity impact. To repair delamination it was suggested to drill small holes within the delamination zone and use ultrasound exciter to intensify liquid matrix impregnation. Compression strength of a plate after repair occurs to be 80-90% of the original value (p. 168-175; fig. 8).

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MODERN THERMAL ANALYSIS TEST METHOTOLOGY OF PREPREGS AND POLYMER COMPOSITES THEREOF ... 176

As a matter of fact modern computerized multifunction thermal analysis equipment is real mobile laboratories. They are capable to solve a large variety of technological and material science problems, in applied scientific research works, as well as in product inspection. In industrial production environment the thermal analysis test methods must ensure not only high accuracy, but it must be productive enough and provide objective results. In the present article there disclosed some peculiarities of the thermal analysis test methods providing actual process-dependent parameters of fiber reinforced of thermosetting resin consolidation (p. 168-175; fig. 6).