

- mentals of Fracture (ICCF-V), Aug. 18-21, 1997, NIST, Gaithersburg, Maryland, USA, pp 28-29.
3. N.S. Kissel and V.P. Kisel, *Mater. Sci. Engn. A*, 2001, vol. 309-310, pp 97-101.
 4. A.K. Mukherjee, W.G. Fergusson, et al. *J. Appl. Phys.*, 1966, vol. 37, No 10, pp 3707-3713.
 5. V.P. Kisel. *J. Phys. (Paris)*, 1985, vol. 46, Suppl. No 12, pp C10-(529-532).
 6. S.V. Razorenov, G.I. Kanel' et al. *Fiz. Metal. Metallovedenie*, 2003, vol. 95, No 1, pp 91-96
 7. J.J. Gilman, W.G. Johnson. *Solid State Physics*, 1962, vol. 13, pp 147-222.
 8. E.V. Darinskaja, A.A. Urusovskaja, et al., *Fiz. tverd. Tela*, 1982, vol. 24, No 3, pp 940-941
 9. R.Z. Valiev, I.V. Aleksandrov, *Doklady Acad. Nauk*, 2001, vol. 380, No 1, pp 34-37.
 10. V.R. Regel, F.I. Slutsker, E.T. Tomashevskii. *Kineticheskaja priroda prochnosti tverdykh tel*, Moscow, Nauka, 1974, 560 pp (in Russian).

DEFORMATION OF MOLECULAR AND CELL STRUCTURES IS THE KEY MECHANISM OF AGEING AND ILLNESS

Kisel V. P.

Institute of Solid State Physics, Chernogolovka,
kisel@issp.ac.ru

Literature data irrefutably evidence for the deformation origin of physiological, physical and chemical stress effects on biological tissues (BT), cells growth and proliferation, differentiation, diseases and ageing, which is irresistibly identical to the stiffening or softening deformation of solids with the appropriate production of lattice defects with various dimensions (reactive oxygen species, ROS, in mitochondria of BT stimulate oxidative stress in cells, etc.). Our comparisons of the mechanisms of plasticity (MP) in living BT under arterial blood pressure oscillations (this work), metabolic transformations and stresses, in various states of different materials under load [1] show that MP are strictly the same on atomic-to-cosmic scale lengths. This is the irrefutable argument in proof of the new paradigm [1] of decisive role of MP and phase mismatch-interface stresses in or between growing and differentiating cells, in each stage of their phase transitions: biochemical reactions, the origin, development and medical treatment of endogenous diseases, kinetics of ageing and growth of robust and cancerous cells, adaptation, origin of species and populations, etc. In terms of this paradigm the ageing of BT is a typical fatigue mechanical deformation of cells up to their stiffening and fracture (apoptosis). Softening of BT with physical, biochemical, physiological, etc. methods changes the mechanical fatigue limit of the materials, longevity or lifespan of BT and the rate of their hardening/ageing. And this is in line with the epidemiological, clinical and experimental investigations.

1. Kisel V. P., Kisel N.S. Proc. 2nd Int. Conf. "Functional foods for chronic diseases", Nov. 15- 16, 2005, Dallas, USA. Ed. by D.M. Martirosyan, Richardson, TX, USA, 2006, pp 213 – 234.