

Nanomaterials in Extreme Conditions: New Approaches and Non-Resolved Problems

Andrievski R.A.

*Institute of Problems of Chemical Physics, Russian Academy of Sciences, Chernogolovka,
Moscow Region, 142432, Russia*

Practically all nanomaterials are very nonequilibrium. The specific features of nanomaterials, such as the numerous interfaces, segregations and residual stresses availability, define their high level of physical/mechanical properties. However, it is evident that some thermal, radiation, deformation, and corrosion actions can initiate the recrystallization, relaxation and homogenization that lead to the nanostructure annihilation and irreversible decrease of physical/mechanical properties. In this connection, the nanomaterials stability problem takes a great attention.

This report analyses the modern experimental and theoretical data on nanomaterials behavior at high temperatures, irradiation, deformation actions, and corrosion environments. The nanotwinned structures high stability in extreme conditions is marked. Non-resolved problems are underlined.

1. R.A. Andrievski. Review of thermal stability of nanomaterials. Journal of Materials Science **49**, No 4, 1449-1460 (2014).
2. R.A. Andrievski. Nanostructures under extremes, Physics – Uspekhi **57**, No 10, 947-962 (2014).