

## Size Effects in Mechanical Synthesis of some Nickel-based Alloys

D.D. Radev, M. Marinov, V. Tumbalev

Institute of General and Inorganic Chemistry, Bulgarian Academy of Sciences, 1113 Sofia, Bulgaria. *E-mail*: ddradev@gmail.com

Nickel-based alloys find large application in contemporary areas of industry for production of corrosion-resistant and thermo stable superalloys, high-loaded engine parts like turbine blades, medical instruments and implants etc. Here are demonstrated the possibilities of mechanochemical methods for synthesis of nanosized nickel-titanium shape-memory alloys having large application in instrument engineering and nickel-chromium alloys for application in dentistry. Using XRD, SEM/TEM are shown phase and structural transformations of reagents during mechanically-assisted and direct mechanical synthesis of Ni-Ti shape-memory alloys. It was shown that NiTi nanosized powders obtained by direct mechanical synthesis are appropriate to obtain structures with controlled porosity which is a precondition for their application in implantology. Some main mechanical characteristics of multicomponent Ni-Cr alloys are investigated. In synthesis of Ni-Cr alloys is used the simplest scheme of powder metallurgy: mechanical mixing/treatment of starting metal powders, their cold pressing and sintering. Technological, economic and ecological advantages of such approach in comparison with the traditional metallurgical method for thermal alloying of nickel-based alloys are also discussed.