

Nanoparticles of metals and their alloys

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Nanoparticles (NPs) of metals are defined as particles with diameter from 1 to 100 nm. The main reason why they exhibit physical and chemical properties different from bulk materials is high number of atoms on the surface of nanoparticle with low coordination number. Melting point depression of metallic NPs or NPs of their alloys is of high interest in solder-research.

Ag-Cu, Cu-Ni and Au-Ni nanoalloys were studied in this work. Theoretical part explains calculation of phase diagram using CALPHAD approach and calculation of surface contribution, which is important for calculation of NPs phase diagrams.

Experimental part deals with synthesis on NPs in aqueous or non-aqueous solutions under the inert atmosphere to prevent oxidation of the NPs. The synthesized NPs were characterized by the following analytic techniques – overall composition using ICP-OES; shape and size via DLS, TEM, HR-TEM, SEM; structure by XRD, HT-XRD and temperature phase transformations via DSC. Synthesized NPs were used for viability test of the human ovarian carcinoma cells.