

## Nanocomposites and nanomaterials

### Synthesis and characterization of pure Ni and Ni-Sn intermetallic nanoparticles

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The nanosize effect, namely the excess surface free energy, leads to significant discrepancies in different quantities of the same material in the bulk and nanosized form. The unique physico-chemical properties of nanoparticles and their potential to be employed in numerous industrial applications lead to intensive research on nanostructured materials. Furthermore, a considerable amount of research is related to the study of different methods of nanoparticles fabrication for further possible application in various branches of industry. For instance, both nanosized and nanocomposite lead-free solders have attracted interest within the international research community.

Our recent research focused on the synthesis of Sn-Ag-Cu (SAC) nanoparticles [1] and the investigations of nanocomposite SAC solders reinforced with Co nanoparticles [2]. The current study relates to the synthesis of Ni and Ni-Sn nanoparticles via a chemical reduction method. Transmission electron microscopy was used for particle size analysis, while the surface area was estimated with a BET surface area analyzer. Furthermore, the thermal stability of nanoparticles was investigated using DTA/DSC analysis together with powder X-ray diffraction.

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1. *Roshanghias A., Yakymovych A., Bernardi J., Ipser H.* Synthesis and thermal behavior of tin-based alloy (Sn–Ag–Cu) nanoparticles // *Nanoscale*.-2015.-7.-P. 5843-5851.

2. *Plevachuk Yu., Yakymovych A., Kainzbauer P., Roshanghias A., Švec P. Sr., Šebo P., Janičkovič D., Sklyarchuk V., Ipser H.*, Structure and electrical properties of Sn-3.8Ag-0.7Cu solders with nano-sized Co additions // 15<sup>th</sup> International IUPAC Conference on High Temperature Materials Chemistry, March 29-April 1, 2016, Orleans, France.-2016.-P. 81.