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And again about PGE minerals with Sn

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The complex intergrowths of Platinum Group Minerals are studied, and mechanisms of their formation in ores are discussed. The new data were obtained and the existing notions about the minerals and synthetic compounds in the system Pd-Pt-Sn-Cu are revised. The stannopalladinite group minerals with generalized formula (Pd,Pt,Cu)3Sn have been studied using XRD, SEM, Mössbauer spectroscopy, and oth. This allows an understanding of the structural relationship between the ordered structures derived from Cu3Au Str.type. "Non-stoichiometry" of Pd (Pt)-Sn-Cu minerals is caused by thin intergrowths of phases neighbouring in the system, for example Pd9Sn4Cu3 + Pd5Sn2Cu or Pd5Sn2Cu3 + (Pd,Cu)3Sn. Pd2Sn is often a component of such aggregates. An attempt was made also to study features of tin valence state in compounds with palladium and copper.
These data are compared with the results obtained for other Pd-Sn-Sb compounds, i.e. with As and Sb, such as minerals Pd2(Sn,As)-Pd2(Sn,As), Pd2(Sn,Sb)- Pd2(Sb,Sn) Pd3(As,Sn). It is noted that in spite of different Sn, Sb, and As content, there is a significant similarity between the values of isomeric shifts, δ. Pd-Sn-Cu compounds except PdSn2 are characterized by a little smaller isomeric shift than Pd-Sn-As and Pd-Sn-Sb phases.
The new mineral phase from the isomertieite family is found in Norilsk Cu-Ni-PGE ores. The group of isomertieite includes very interesting mineral species - isomertieite, Pd11As2Sb2 (Clark et al, 1974), Miessiite, Pd11Se2Te2 (Kojonen et al., 2007), Törnroosite, Pd11As2Te2 (Kojonen et al., 2011). Generally these minerals are presented as very small grains, often in close intergrowths with other PGM, and are characterized by complex composition. Until recently isomertieite was one of the rare PGM. However, there are many publications of recent years described isomertieite from placers of Burma, British Columbia, from Bushveld complex, Monchetundra complex and oth. isomertieite with some Sn and Pb content in composition was observed in various ore types from Oktyabr'skoje and Majak deposits. The grain sizes of mineral does not exceed 30 microns. The most common inclusions are <5 microns in size, and are observed in associations with stannopalladinite, polarite, Pd-Pt bismutotellurides, majakite. It was found also one very interesting zonal isomertieite bearing PGM intergrowth with valleriite. Apart from "normal" isomertieite in Norilsk ores there are some grains which contain more than 11 Wt% of Sn. These mineral phases are homogeneous under SEM +EDS (7000 – 12000 magnification). Their composition could be presented by formula (Pd,Pt)11(As,Pb)2(Sn,Sb)2 with varying Sn-Sb content. The data obtained would confirm the assumption that there is an isomorphous series between isomerteite Sn and "Sn-isomertieite". However, this issue requires further study. The optical properties of izomerteite with different composition are compared. The mineral associations with isomertieite are considered. According to X-ray powder data indexing (TREOR) the structural transformation of Pd-As-Sn-Sb (Bi) phases is discussed.