Partial melting features of metamorphosed ores from Rangpo polymetaltic deposit (Sikkim, India)

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Investigation of metamorphosed; ores is especially interesting because of current thinking (Mookcherjee, 1967; Parilov, 1984; Starostin, *et al.*, 1990) on possibility of appearance of sulphide melts due to metamophism of ores.

Samples of metamorphosed ore from Rangpo polymetallic deposit have been studied by means of ore microscopy and EPMA. Sphalerite, pyrrhotite, chalcopyrite, magnetite, arsenopyrite and Co-sulpharsenides are the main ore minerals in the samples studied. Pyrite, galena and Ag-fahlores are less abundant. Rare minerals – molybdenite, sulphosalts and native Bi and Ag. The ore minerals are intimately interlocked with silicate gangues (garnet, orthorhombic pyroxene, amphibole and others).

The interesting features of the ore are as follows: 1. Oblong shape of sphalerite grains subordinating to schistosity of slates; 2. Absence of chalcopyrite and/or pyrrhotite emulsion inclusions in sphalerite and vica versa – star-shaped inclusions of sphalerite; 3. Abundant post-metamorphic appearance of magnetite, capturing pyrrhotite layers in schistose textures of ore; 4. Droplets of chalcopyrite-pyrrhotite inclusions in magnetite porphyroblasts and numerouse droplets of non-opaque inclusions in pyrrhotite grains; 5. Myrmekitic (eutectic) intergrowth of predominant galena with the lesser Ag-tetrahedrite, native Bi and pyrrhotite, occuring among the big grains of sphalerite and magnetite; 6. Filling the cricks in garnet idiomorphic grains by magnetite and sulphides without conducting veinlets and noticeable corrosion of the garnet grains; 7. Zonal rhombic-shaped crystals of Co-sulpharsenide, formed by alternating zones of sulpharsenides and galena without conducting veinlets of galena; 8. Finding of new unusual complex sulphide ('mineral G') $Cu_5Fe_6(Pb_6(Bi,Sb,As)_2(S,Se,Te)_{21}$; 9. Absence of isomorphic Ag- and Bi-impurities in galena.

These features of the Rangpo ores resemble those which are formed in smelting products in furnaces. According to Edwards (1954), magnetite crystals are the common product of many mattes, speisses and slags; magnetite in slags often contains droplets of different substances (e.g. Cu-sulphides); eutectic intergrowths, formed by Pb- and Cu-sulphides, occupy small intersticial areas in the smelting products; a complex Cu-As-Sb compound, which may be conpared with 'mineral G' from Rangpo, was observed in the matte containing semi-metals. Such resemblance permits to think that partial melting of ore rninerals took place during metamorphism of the Rangpo ores.

This point of view agrees with experimental works (Brett and Kullerud, 1966; Lowrence, 1967). According to these works, partial melting of sulphides may occur at temperatures around 700°C. Lowrence indicated, the presence of fluxes (water vapour, fluorine and others) may significantly lower the melting point of Pb-Zn-sulphide ores.