

## SILVER CONVERSION DURING PYROMETALLURGICAL PROCESSING OF MINERAL MATERIALS

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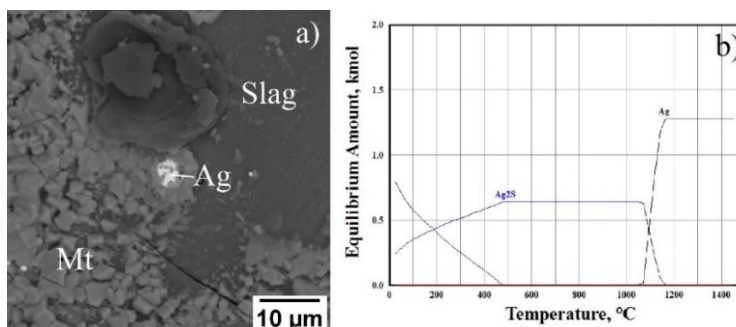
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During pyrometallurgical processing of copper ores and concentrates, some silver is lost with slags [1]. To develop technologies for reducing losses, it is necessary to study the sequence of transformations of silver compounds during the heating and melting of mineral materials. The behavior of silver during the heating and melting of argillite, electrolytic sludge and technogenic sulfides was studied using thermodynamic modeling with the HSC Chemistry package, as well as experimentally. The melting products were analyzed using a scanning electron microscope. It has been shown that silver in its initial state is present predominantly in the form of  $\text{Ag}_2\text{S}$ . Based on the results of thermodynamic modeling, it was established that in the temperature range of 600-1050 °C, silver transforms into a metallic state in all of the listed mineral materials (see Fig). This is even lower than its melting point (~962 °C). The calculations are confirmed by experimental data. After heating all of the aforementioned materials to 1350-1450 °C, silver was found to be in metallic form (see figure). The heating rate was 10 °C/min. The sizes of Ag particles vary in the range from 1 to 30  $\mu\text{m}$ .



Silver in mudstone when heated to 1450 °C: a) the Ag drop on the slag surface after melting; b) the equilibrium composition for silver compounds

1. Tsemekhman L.Sh., Fomichev V.B., Yertseva L.N., et al. Atlas of Mineral Raw Materials, Technological Industrial Products and Marketable Products of JSC MMC Norilsk Nickel. Moscow: Ore and Metals, 2010. 336 p.

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