Marcin Kania

Title of the PhD thesis:

Chemical and mineralogical characteristic of the detrital gold from selected Lower Silesian alluvial deposits

ABSTRACT

Mineralogical studies of the schlich from the ore-bearing sediments can be used in prospecting of the strategic and critical metals ore deposits. Gold-bearing sediments are particularly attractive subjects of this type of studies. Prospecting of hydrothermal gold-bearing deposits creates the opportunities to discover deposits of the other scarce metals like silver, platinum, palladium, tellurium, bismuth or antimony.

Performing the particular mineralogical studies of the gold grains constituted an essencial element of the presented studies. Examined grains originated in the Lower Silesian occurences of the gold-bearing sediments. The primary objective of the studies was to determine the Au-bearing mineral assemblages, indicate the probable alimentary areas of the gold grains and revise the existing assumptions concerning their origin.

Presented studies focused on the identification of the mineral inclusions in the gold grains, especially inclusions of the ore minerals. Mineralogical analyses of inclusions have been completed by morphological and chemical studies of the gold grains. The used methodology required performing of the whole analyses using microscopic sections. In order to allow testing of the gold grains shapes in cross-section, innovative tests of the grains morphology have been applied. These tests are based on the measurements of the grain's circumference and its cross-sectional area.

Test results of the gold grains from five Lower Silesian alluvial deposits have been presented. These deposits are: Skora river, Wierzbiak and Kraszówka streams, Jamna and Żeliszowski Potok creeks. Gold grains occuring in mentioned before watercources have got an admixtures of silver, mercury, copper, tellurium and palladium. Numerous inclusions of ore minerals, mainly Fe-Ni-Co sulfoarsenides, Pd selenides and tellurides, Cu selenides and Pb, Fe, Cu and Bi sulphides have been found inside them. Mentioned before ore minerals represents two different

gold-bearing mineral assemblages: the meso- to epithermal Co-Ni-Ag-Bi-As formation and the red-bed type, Cu-polymetallic formation. The third, pegmatitic assemblage has been identified on the basis of inclusions of the rock-forming minerals and their chemical composition. Thus it has been shown that gold grains from the Lower Silesian alluvia are polygenetic. Moreover, applied research method can be successfully used in polymetallic ore depoits prospecting.

Comparison of the results of morphological and chemical tests allowed to define the probable trend of the chemical composition's evolution of the gold grains. Moreover, these results indicated the regeneration of the almost every investigated gold-bearing sediments and revealed the coexistance of the gold grains of natural origin and anthropogenic amalgams. Distinction between these two types of gold is necessary to provide correct determination of the detrital gold's origin.