

Sulfidation of native gold

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ABSTRACT

We use microscopic and electron microprobe techniques to study samples of ores containing native gold with dark rims of Au-Ag sulfides from six deposits and ore occurrences of Russia: Khopto (Au-Cu-skarn), Ulakhan, Yunoe (Au-Ag epithermal), Dorozhnoe, Konechnoe, and Yakutskoe (Au-quartz). Dark rims around native gold are uytenbogaardtite (Ag_3AuS_2) or petrovskaitite (AgAuS), or a mixture of acanthite (Ag_2S) with uytenbogaardtite or uytenbogaardtite with petrovskaitite. In the ore samples from the Khopto and Ulakhan deposits, we have found microrims of higher fineness gold at the contact of native gold and Au-Ag sulfide. The reactions of native gold sulfidation occurring in natural processes are proposed based on the compositions of Au-Ag sulfides, their mutual textural relationships. The composition of Au-Ag sulfides rims was found to depend on the primary fineness of native Au: uytenbogaardtite forms after gold of fineness above 380‰, whereas petrovskaitite, above 650‰. We propose that the fineness of gold and silver may be used for forecasting presence of uytenbogaardtite or petrovskaitite, or a mixture of acanthite with uytenbogaardtite or uytenbogaardtite with petrovskaitite in sulfide ores at Au-Ag epithermal, Au-skarn, Au-Cu volcanic-hosted massive sulfide, Au-quartz-sulfide, and other deposits.

Keywords: Uytenbogaardtite, petrovskaitite, native gold, fineness, reactions of sulfidation