

Silver isotope systematics in native Ag from hydrothermal Mo-Cu, Cu-Pb-Zn and Ag-Au deposits

S. TESSALINA^{1*}

¹John de Laeter Centre for Isotope Research, Curtin

University, Bentley 6102, WA, Australia

(*Correspondance: Svetlana.Tessalina@curtin.edu.au)

The native silver samples from hydrothermal base and noble metal deposits have been measured for Ag isotopic composition using MC-ICPMS applying Ag standard bracketing and Pd standard for mass bias correction [1]. The range of $\epsilon^{107}\text{Ag}$ (natural shift in the $^{107}\text{Ag}/^{109}\text{Ag}$ ratio relative to Ag standard NIST SRM 978a) in native silver samples from these deposits vary from -4.6 to +3.3. The most negative values were obtained for native silver from Cu-Mo porphyry Sorskoye and Ag epithermal Imiter deposits, with recognized predominantly mantle source of ore metals [2]. The most positive values were encountered for the sediment-hosted Nochnoye Ag-Pb-Zn *deposit in clastic metasediments*, and Broken Hill polymetallic Sedimentary Exhalative deposit, the latter with confirmed crustal source of ore metals [3]. The Volcanic Hosted Massive Sulphide deposit Teutonic Bore ($\epsilon^{107}\text{Ag} = -1.1$) occupies an intermediate position, close to the bulk silicate Earth value of -2.2 ± 0.7 for $\epsilon^{107}\text{Ag}$ [4]. Thus, the source reservoirs (mantle vs crustal) seem to influence the isotopic composition of Ag, possibly due to lower temperature redox changes associated with crustal processes. Possible mechanism of isotopic fractionation includes the nuclear volume shift [5] due to the retraction in Ag^+ nuclear volume as a result of s-electron removal ($\text{Ag}^0 \rightarrow \text{Ag}^+$ transition). The Ag isotope systematics may constitute a new promising tool for mineral deposits studies, especially these related with Au-Ag alloys.

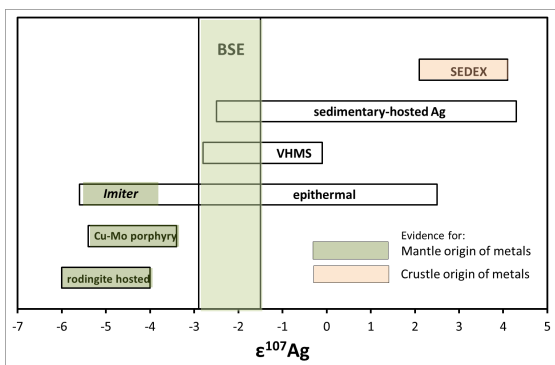


Figure 1. Isotopic composition of Ag (s $\epsilon^{107}\text{Ag}$) in different deposits types. Our data are compiled with data from rodingite-hosted Karabash and VHMS Kidd Krick deposits [6].

[1] Schönbächler et al. (2007) *IJMSIP*, 183-191. [2] Levresse et al. (2005) SGA proceedings, 23-26. [3] Raveggi et al. (2015) *Ore Geol Rev* **65**, 228-244. [5] Shauble (2207) *GCA* **71**, 2170-2189.