

Exploratory investigation of precious metals-bearing mineral assemblages from Assarel porphyry copper deposit (Srednogorie zone, Bulgaria)

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Assarel porphyry copper deposit is located in the Central Srednogorie zone (Panagyurishte ore district, Bulgaria) which is part of the Late Cretaceous Apuseni–Banat–Timok–Srednogorie magmatic and metallogenic belt. The ore deposit is related to Late Cretaceous emplacement of subvolcanic rocks (quartz-diorite, quartz-monzonite, granodiorite and granite) that intruded Palaeozoic granitoid basement and Late Cretaceous volcanic rocks.

The primary mineralization consists mainly of chalcopyrite, pyrite ± magnetite, bornite, molybdenite and enargite; covellite and chalcocite are dominant in the supergene alteration zone.

Investigations by electron microscopy suggest the formation of the precious metals from Te- and Se-bearing fluids, which induced the occurrence of nagyagite (Te, Au)Pb(Pb,Sb)S₂, hessite (Ag₂Te), empressite (AgTe), aguilarite (Ag₄SeS), naumannite (Ag₂Se) and clausthalite (PbSe). These minerals, as well as idaite (Cu₃FeS₄), greenokite (CdS), acanthite (Ag₂S), bismuthinite (Bi₂S₃), native gold, native silver, native copper and copper-tin alloys, are present both as microinclusions within pyrite, chalcopyrite and in the groundmass. This research indicates that precious metals began to precipitate since the early stages of porphyry type mineralization.

Acknowledgements. This research is part of the X-MINE project, funded by European Union's Horizon 2020 research and innovation programme under grant agreement No 730270.