

**THE MAGMATIC–HYDROTHERMAL TRANSITIONAL  
PROCESS EVOLUTION OF THE BAIA DE ARIEȘ NEOGENE  
BRECCIA PIPE ORE DEPOSIT (APUSENI MOUNTAINS,  
ROMANIA) VIA MINERAL MICROINCLUSIONS IN PYRITE**

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Gold bearing and polymetallic mineralizations at Baia de Arieș are spatially and genetically closely related to breccia pipe structure developed on the top of some shallow subvolcanic bodies.

SEM-EDAX quantitative analyses, performed on pyrite crystals sampled from the Baia de Arieș ore deposit, reveal a large spectrum of mineral microinclusions, as follows: Fe sulphides, K and K-Fe chlorides, sericite, anhydrite, carbonates (Ca, Ca-Fe, Ca-Mn-Fe), apatite, hematite, titanite, marcasite, pyrrhotite, sphalerite, quartz, spinel. According to their origin and position in the host mineral these microinclusions are daughter phases, arborescent microstructures and captured minerals.

Based on these mineral microinclusions, the following paths of the magmatic–hydrothermal transitional process evolution of the Baia de Arieș breccia pipe ore deposit could be inferred:

1. Breccia column formation according to Burnham's model (BURNHAM, 1985).
2. Ascension of high temperature fluids with K and Fe rich composition, the potassic neomineral association requiring a pH 3–6 (CRERAR & BARNES, 1976).  $(\text{PO}_4)^{3-}$  in solution is supported by apatite presence in the mineral paragenesis.  $\text{H}_2\text{S}$  increasing in solution leads to Fe sulphide deposition.
3. Zn, Pb sulphide deposition at the same physico-chemical constraints ( $T = 350\text{--}400\text{ }^\circ\text{C}$ ,  $\text{pH} = 3\text{--}6$ ) favouring under lithological control (calcareous rocks) an abundant deposition of zinc and lead sulphides (HEMLEY & HUNT, 1992) at the Valea Lacului zone. Supplementary, the estimation of the process constraints is based on geothermometric determinations using both the distribution of Cd and Mn between coexisting sphalerite and galena ( $350\text{--}390\text{ }^\circ\text{C}$ ), and the sulphur isotope fractionation data ( $430\text{ }^\circ\text{C}$ ).

The presence of K, Fe chlorides in the magmatic and hydrothermal mineralization stages emphasizes the transitional process (NEDELCU *et al.*, 1998) occurred in the Baia de Arieș breccia pipe system.

References

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NEDELCU, L., ROSU, E. & COSTEA, C. (1998). CBGA XVIth Congress, Vienna, Abstracts: 417.