

## Clathrasil compound evidence in fluid and brine inclusions by microthermometry and Raman spectroscopy

I. PINTEA<sup>1\*</sup>, S. UDUBASA<sup>2</sup>, L. NUTU-DRAGOMIR<sup>3</sup>,  
L. IATAN<sup>3</sup>, I. BERBELEAC<sup>3</sup>, L. PETRESCU<sup>2</sup>, E. GHINESCU<sup>1</sup>

<sup>1</sup>Geological Institute of Romania, 012271 Bucharest, Romania (\*correspondence: ipinteaflincs@yahoo.com)

<sup>2</sup>University of Bucharest, 010041 Bucharest, Romania

<sup>3</sup>Institute of Geodynamics of Romanian Academy, 020032 Bucharest, Romania

Evidentiated as “a coarsened solid phase” during experimental work by [1] in sulphate-bearing fluid system at high T and P the presumed clathrasil compound was observed by us in the biphasic and brine inclusions from porphyry copper and pegmatite quartz samples from Alpine area in the Apuseni Mts. (Romania) by microthermometry and Raman spectroscopy. When the magmatic-to-hydrothermal fluid/melt was trapped as inclusions in quartz coarse grains from porphyry Cu-Au (Mo) deposits or prismatic ones from pegmatites, a presumed silica-rich phase was formed due to the presence of sulphate and/or carbonate ions in the hydrosilicate liquid solution in a large range of PTX conditions up to 1000°C, 2kb and 70 wt% NaCl eq. Also a tiny transparent, fragile glassy crust could be envisaged at room temperature conditions up to 300°C [2]. The Raman spectra of the brine, vapor and liquid-rich aqueous inclusions are suggestive for a “zeolitic” amorphous solid which solidified at low temperature about 70°-150°C. It is supposed that at the moment of trapping the hydrosilicate liquid phase is a realistic emulsion containing alkali, H<sub>2</sub>O, CO<sub>3</sub><sup>2-</sup>, HCO<sub>3</sub><sup>-</sup>, SO<sub>4</sub><sup>2-</sup>, P<sub>2</sub>O<sub>5</sub>, PO<sub>4</sub><sup>3-</sup>, CO<sub>2</sub>, CH<sub>4</sub>, ore elements (Fe, Cu, Au, Mo) and volatiles (Cl, F, P, S). Decreasing T and P induced the physical separation of the clathrasil compound, anhydrite, carbonate and/or silicates minerals, followed by opaque, halite and hydrated solid phases, as recorded by microthermometry [3]. Our study shows that hydrosilicate liquid (silicothermal fluid or heavy fluid) seems to be an effective scavenger and carrier of ore elements mainly because of their specific internal “cage” structure [4] of the liquid state (colloidal or hydrogel). The ore elements were expelled during fluid contraction and multiple fluid/melt immiscibility stages.

[1] Kotel'nikova & Kotel'nikov (2010) *Geochem. Intern.* **48**, 4, 381-389; [2] Pintea *et al.* (2018) *R. J. Min. Dep.* **91**/1-2, 13-18; [3] Pintea *et al.* (2018) *Goldschmidt Conf. Abstr.*, 2033. [4] Momma (2014) *J. Phys. Cond. Matter* **26**(10): 103203.