SILICATE-CARBONATE-CO_2 IMMISCIBILITY IN ALKALINE ROCKS: EXAMPLE FROM INCLUSIONS IN CLINOPYROXENE OF TRACHYTIC LATITES AT CASERIO FUENTE DE MECA, MAZARRON, SE SPAIN

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Introduction

The Miocene magmatic province of SE Spain is characterized by calc-alkaline/shoshonitic and lamproitic rocks. In general, lamproites are mantle-derived rocks, whereas calc-alkaline and shoshonitic rocks have a more complicated origin involving both mantle and crust components (Venturelli et al., 1984; 1991). The origin of some rocks from the southern group of the Spanish lamproite occurrences (Zeneta, Vera) is suggested to be as a result of mixing between lamproitic and shoshonitic components (Fuster, 1956; Venturelli et al., 1984). To other side, the studies of trachytic latites from Caserio Fuente de Meca, Mazarron showed that these rocks possibly also derived due to mixing (Venturelli et al., 1991). This work is concerning to study of unusual silicate melt inclusions in the rocks of Caserio Fuente de Meca.

Petrography of studied rocks

The trachytic latites contain phenocrysts of olivine altered to serpentine, phlogopite-biotite, clinopyroxenes and apatite (sizes – up to 0.5 mm). Groundmass consists of rhyolitic colorless glass, clinopyroxenes, phlogopite and apatite. In addition, large carbonate globule (up to 0.5 mm) occurs in the groundmass. The minute crystals of zircon and spinel sometimes occur as single inclusions in phenocrysts and as accessory phases in the groundmass.

Silicate melt inclusions

Silicate melt inclusions are found in all phenocrystal minerals, but they are more common for clinopyroxene. In this mineral the inclusions are mainly situated in the central parts or outline the growth zones. Their phase composition is diverse: some inclusions contain rhyolitic glass, fluid and daughter/trapped phlogopite, but most inclusions consist of glass and heterogeneous fluid bubble (CO_2*vapor*, CO_2*liquid*, and carbonate) and rarely individual carbonate globule (Fig. 1). It should be noted that individual carbonate inclusions coexisting with melt ones are absent. The heterogeneity in fluid bubble is expressed in variable amount of constituent phases. Majority of fluid bubble contain mainly CO_2*vapor* and CO_2*liquid*, carbonate is minor. In inclusions, in which carbonate dominates; the vapor represents the CO_2 phase.

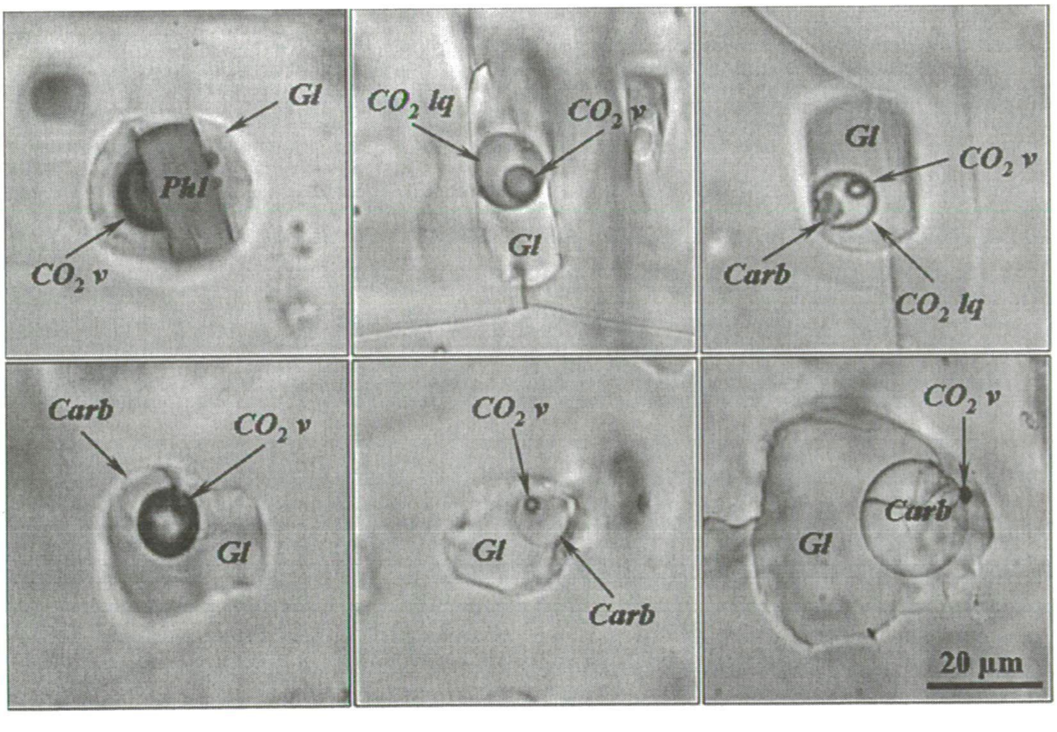

Figure 1. Silicate melt inclusions in clinopyroxene phenocrysts from trachytic latite, Caserio Fuente de Meca, SE Spain. **Gl** –rhyolitic glass; **Phl** –phlogopite; **Carb** – carbonate; **CO_2 v** and **CO_2 lq** – carbon dioxide vapor and liquid, respectively.

Dicussion

Silicate melt inclusions in latites of Caserio Fuente de Meca demonstrate a unique case when CO_2 and carbonate may coexist in silicate glass. This case shows an evidence of silicate-carbonate-CO_2 immiscibility in siliceous volcanic rocks. It is unknown what is namely was main reason to appear this phenomenon in the Spanish rocks. Possibly, it was contamination of carbonate rocks by siliceous magma within the upper-middle crust. The silicate-carbonate liquid immiscibility is more common for evolution of silica-undersaturated igneous rocks. For example, this phenomenon was observed in mineral-hosted melt inclusions of the Umbrian kamafugitic rocks (Italy), the Leucite Hill lamproites (USA) and mantle-derived xenoliths of the Canary Islands (Sharygin, 2001a, b; Frezzotti et al., 2002).

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