

Myrmekite: constraints on the available models and a new hypothesis for its formation

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Abstract: Based on a myrmekite occurrence around K-feldspar megacrysts (porphyroblasts) in a mylonitic augen gneiss from southeast Brazil, a critical discussion on myrmekite genesis highlights some constraints on the available myrmekite models, mainly with regard to the replacement direction in the K-feldspar/myrmekite interface. In the investigated augen gneisses, chemical and microstructural data indicate that myrmekite does not replace K-feldspar (as generally inferred in other myrmekite occurrences), but in fact is replaced by it. Alternatively, myrmekite is suggested to form by SiO₂ infiltration of pre-existing plagioclase grains during K-feldspar porphyroblastesis. The local stress induced by volume change during plagioclase replacement by K-feldspar enhances deformation around the growing porphyroblast, enabling SiO₂ infiltration to occur along the discontinuities (microcracks and kink boundaries) of deformed plagioclase grains. The development of quartz vermicules in the K-feldspar vicinity accounts for the access of SiO₂ necessary for plagioclase replacement by K-feldspar, enabling the advance of the K-feldspar porphyroblast.

Key-words: myrmekite, K-feldspar, porphyroblastesis.

Introduction

Myrmekite is an intergrowth of vermicular quartz and plagioclase in contact with K-feldspar (Phillips, 1974) commonly found in granite-gneisses, which has been a controversial subject in petrology since the first description by Michel-Lévy (1875). Although a number of new observations and genetic models have been published in the last thirty years (*e.g.* Shelley, 1964; Bhat-tacharyya, 1971; Ashworth, 1972, 1986; Phillips

et al., 1972; Augustithis, 1973; Phillips & Carr, 1973; Hibbard, 1979; Phillips, 1980; Simpson, 1985; La Tour, 1987; Collins, 1988; Simpson & Wintsch, 1989; Stel & Breedveld, 1990; Hopson & Ramseyer, 1990; Castle & Lindsley, 1993), controversy still exists. Any model for myrmekite must be able to explain its characteristic morphology, whose main features are summarized in Fig. 1.

Classical ideas on myrmekite genesis involve a wide range of processes such as exsolution,

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