ELECTRON MICROSCOPIC INVESTIGATIONS OF PERTHITE, MYRMEKITE AND RAPAKIVI STRUCTURES IN FELDSPARS OCCURRING IN THE GRANITIC ROCKS OF THE DODA AREA

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Abstract

Patchy, vein, film, and crypto types of perthites, rapakivi structure, and myrmekite texture are commonly developed in the potash-feldspar augen of the granitic gneisses of the Doda area, Jammu and Kashmir State.

The scanned perthites show an interlamination of microcline and albite resulting in a criss-cross pattern. Islands of soda-feldspar in potash-feldspar show embayed margins. These interrelationships appear to be the result of exsolution phenomenon. Segregated sodic-calcic components replace the host potash-feldspar releasing blebs and globules of quartz which are present in the form of myrmekite texture.

Introduction

The purpose of this note is to discuss the intergrowth fabrics like perthite and myrmekite and to decipher details of temporal and spatial relationship between albite and microcline components in the rapakivi structure by electron microscopy. It is also intended to study the development of microcracks and fracture surfaces in feldspars occurring in the granites of the Doda area, Jammu and Kashmir State (for details of Doda granites see Gupta, 1981; Guha, 1985).

Materials and methods

Augens of perthitic feldspars and those showing rapakivi structure were separated out from the granitic rocks and were cut to a size of $0.5 \times 0.4 \times 0.2$ cm dimension. The polished specimens, were etched with 40% HF for about 10 to 15 seconds so that the perthitic lamellae and the rapakivi structure became prominent. They were then mounted on stubs, gold-plated and scanned using the Jeol S-25 model scanning electron microscope (SEM).

Observations

Perthites: An electron micrograph of a crypto-perthite section (100) shows two directional fractures (cleavages) (Pl. 1A) though one is better developed than the other.

EXPLANATION OF PLATE I

A. Electron micrograph of a (100) section of the cryptoperthite potash feldspar. The dark pits are indicative of albite (AB) lamellae (bar=10 millennium).
B. Electron micrograph showing transgranular fractures (TF) in the cryptoperthite potash feldspar (bar=10 millennium).
C. Electron micrograph showing the contact of cryptoperthite microcline and albite (AB) in a section (100) of a feldspar augen exhibiting rapakivi structure. Note the pores of quartz (QZ) (bar=10 millennium).
D. Micropatchy perthitic microcline (MI) electron micrograph exhibiting irregular patches of albite (AB) (bar=10 millennium).
E & F. Cryptoperthite showing unidirectional fractures in a section (001) or (010). This fracture may be related to its cleavage (bar=10 millennium).

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the other. Both the fractures are probably controlled by crystallographic directions. The dark pits are of albite lamellae (cf. Greer, 1970) which seem to have separated by solid-solution. The fracture surfaces are, in general, uneven. The islands of albite show embayelled margins towards microcline. (010) or (001) section of the crypto-perthite shows one directional fracture (Pl. 1E, F) which may be related to cleavage. It also shows transgranular fractures of lesser importance (Pl. 1B). The pits are represented by albite lamellae. They are interconnected and may represent channels of exsolution. Section (010) or (001) of micropatchy perthitic microcline shows irregular patches of albite (Pl. 1D). The patches appear to be interconnected with each other, and consequently they may have developed due to the separation of sodic-calcic components from the microcline. Cleavage is, however, obscured in this case.

**Myrmekite:** Crypto-perthite section (100) shows transgranular fractures and the development of myrmekite texture at the lower left corner (Pl. 1B). Quartz is present in the form of elongated blebs. Albite lamellae tend to replace microcline component with the release of blebs of quartz. This results in the intergrowth of albite and quartz leading to the development of myrmekite texture.

**Rapakivi structure:** Pl. 1C shows contact of microcline and albite in section (100) of an augen showing rapakivi structure. At the contact of microcline crypto-perthite, the albite gets concentrated probably on account of the outward migration of exsolution towards the right side of the micrograph (Pl. 1C) and gives rise to a partial or complete albite mantle over the crypto-perthite microcline. At the margins of the albite and microcline, quartz is also present in the form of globules showing pores (for the meaning of pores, see Dengler, 1976). Petrographic observations show that myrmekite is always associated with rapakivi structure and develops due to the replacement of microcline by albite. It is clear from the micrograph that the albite component of the rapakivi mantle replaces microcline to give rise to myrmekite texture.

The micrographs show clearly that the film and crypto-perthites lamellae in the feldspar augen of the Doda area developed along cleavages of the microcline by exsolution. Sodic-calcic components after separation from the microcline migrated outwards and crystallised around the host microcline in the form of albite rims exhibiting rapakivi structure (cf. Gupta, 1967). Subsequently, albite replaced microcline-core and developed myrmekite (cf. Gupta, 1970).

**Acknowledgements:** Thanks are due to Professor A. Sahni for rendering help in scanning the specimens.

**References**


(Received: Feb. 14, 1985)