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PORPHYRITIC GRANITE FACIES - SZKLARSKA PORĘBA HUTA

INTRODUCTION

Many authors have reported petrography of granite of the Karkonosze pluton. Berg (1923) distinguished three types of granites taking into account mainly their textural features: granite with porphyritic feldspars (porphyritic granite), equally-grained granite and aplitic granite. The porphyritic granite facies is dominating, whereas the equigranular as well as the aplitic one are subordinate. The porphyritic type has been included to central granite by Borkowska (1966), who has renamed the remaining Berg's groups to ridge and granophyric granite. All of the granite groups appear together, although the ridge granite forms usually the Karkonosze mountain ridge undergoing at many places into porphyritic (central) and granophyric types. Cloos (1923) combining textural and modal features distinguished three zones within granite pluton: schlieren-poor homogeneous core (mountain ridge), biotite schlieren-rich inner mantle, aplite schlieren-rich external sheeting mantle. Modal composition of the rocks has been the basis for Klominsky's (1969) classification of Karkonosze granitoids. Four types of biotite granite, two-mica granite, and three types of granodiorite could be distinguished within the pluton. Karkonosze massif is mostly peraluminous I-type with subordinate metaluminous ones (Wilamowski, 1998; Domańska et al, 2002, this volume).

PETROGRAPHY

Granite in Szklarska Poręba Huta quarry is typical porphyritic (central granite) type. Mantled alkali feldspar megacrysts, biotite schlieren and numerous enclaves are common in porphyritic granite facies (Berg, 1923; Borkowska, 1966). Aplite veins abundant in pegmatitic nests cut the rock. The porphyritic variety is a subsolvus, two-feldspar granite with a big scatter of the contents of feldspars content: alkali feldspar 19-35%, plagioclase 25-39% (variance for the whole porphyritic group). Feldspars form two generations (Borkowska, 1966). The first one comprises large phenocrysts, usually ovoids or euhedral alkali feldspars with or without plagioclase mantle (rapakivi texture). The megacrysts contain biotite, plagioclase and quartz inclusions. Large, single plagioclase phenocrysts are also

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found. Phenocrysts are spread incidentally within the rock or are organised in fluidal structures. Locally the phenocrysts together with biotite schlieren form fluidal, banded structures, where the felsic minerals are perfectly segregated from the schlieren. The schlieren accompanied additionally equally-grained parts of granite. The matrix crystals belong to the second feldspar generation. Both feldspar generations differ in composition, growth morphology and structure. The feldspars are accompanied by quartz (22-40%), which mainly crystallized together with matrix generation but appears also as inclusions in alkali feldspar megacrysts. Some of the quartz crystals are poikilitic with corroded biotite, plagioclase and an earlier quartz generation relics, which in turn are surrounded by minute rims of felsic and mafic minerals (Klar, 1986). Myrmekite is common as vermicular intergrowths in matrix sodic plagioclase. The major mafic mineral appearing in porphyritic granite (as inclusions in megacrysts as well as matrix crystals) is biotite. Its amount does not exceed usually 6% (up to 22% in biotite rich variation recognised within the whole facies). Muscovite, hornblende, epidote, Fe-Ti oxides, zircon, apatite, titanite, allanite and fluorite are accessory minerals (<1%) in the porphyritic granite facies. Many of them accompany matrix biotite or biotite-hornblende nests.

Porphyritic granite facies contains numerous enclaves of more or less nodular shape. Milch (1899) called them *Kugel* or *Knollenschlieren* and classified them into two groups: with the composition close to dioritic and with the composition close lamprophitic rocks. Milch (1899), Berg (1923) and Borkowska (1966) consider the enclaves to be the xenoliths "reworked" by granitic melt. Gunia (2001) denoted geochemical similarities between enclaves and porphyritic granite composition.

Almost all enclaves comprise plagioclase and alkali feldspar, but the ratio and the habit of both minerals vary strongly from one to other enclave (Borkowska 1966). Some of the enclaves are alkali feldspar free, in some of them alkali feldspars appear as phenocrysts. Rarely they appear as rims on plagioclase (anti-rapakivi). Usually alkali feldspars gather on the enclave and granite boundary. Plagioclases are main component in the enclaves occurring locally as phenocrysts or as inclusions in alkali feldspars. They show simply or oscillatory zoning and complex growth morphologies with the compositional variation anywhere from ten to twenty percent of anorthite component. In the enclaves of hornfels-like texture quartz crystals are found. They demonstrate reaction rim with minute hornblende all around the crystal. Mafic minerals accompany feldspars and quartz. The ratio of both groups of minerals is very much diversified in individual enclaves. Also the amount of the main mafic phases, biotite and hornblende (chloritized to various extent), differs in the enclaves. Biotite is more frequent than hornblende.

FINAL REMARKS

Porphyritic granite (central granite) facies show many evidence, that the parental, crustal melt could be contributed by mantle-derived component. Modal

composition of enclaves indicates various extent of hybridization of basic magma blobs introduced into more cool and silica rich melt. Mixing seems to be responsible for changes in the crystallization path of minerals. As a result mantled minerals appear in the system: alkali feldspars with plagioclase mantle, quartz with minute rims of mafic minerals. Non-equilibrium conditions at various stages of magma crystallization could be another example of an open system processes. Plagioclase inclusions in alkali feldspar megacrysts as well as some plagioclases in enclaves show complex growth morphologies with numerous signs of resorption and re-growth as well as stepwise changes in compositional zoning. The most acid zones of almost albitic composition are accompanied by myrmekite, which testify incomplete physical and chemical equilibrium. This last phenomenon, however, may be assigned to mixing but also to magma ascent processes.

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