POLSKIE TOWARZYSTWO MINERALOGICZNE – PRACE SPECJALNE
MINERALOGICAL SOCIETY OF POLAND – SPECIAL PAPERS
Zeszyt 20, 2002; Volume 20, 2002

Piotr GUNIA[1], Irena WOJCIECHOWSKA[2]

GEOCHEMISTRY OF HORNBLENDE-BEARING PYROXENITES WITHIN GRANITOIDS OF THE KŁODZKO-ZŁOTY STOK INTRUSION

INTRODUCTION

The occurrences of pyroxenites are characteristic for contact zone between Kłodzko–Złoty Stok Intrusion and Skrzynka Dislocation Zone representing northern part of Złote Mts. Presence of pyroxenites within granitoids has been reported only from several places of this area. It includes outcrops situated on: 1) northwestern slope of the Haniak hill, north of Złoty Stok 2) on summit of Stróża hill and 3) on south-eastern slope of Ptasznik hill. Described pyroxenites occur chiefly as sharp-edged or vein-shaped enclaves within granitods, up to several metres thick or form NE-SW trending zones of loose blocks several hundred metres long and several tens metres thick (Finckh, 1923, Wierzchołowski 1976, Smulikowski 1976). According to Cwojdziński (1977) the dyke of pyroxenites from the Haniak hill display the same orientation as direction of the older microfolds system exposed in the Skrzynka Dislocation Zone.

From petrologic point of view, the pyroxenites from the Kłodzko-Złoty Stok grainitoids were classified as olivine-hornblende pyroxenites (Haniak hill) or pyroxene-bearing hornblendites (Stróża Hill; Wierzchołowski 1976, Smulikowski 1976, 1979). As it was confirmed by results of microprobe analyses these ultramafics are mainly composed of forsterite (with average of Fo_{86}), diopside-augite clinopyroxene, bronzite-orthopyroxene, common brownish hornblende and the secondary poikilitic intergrowths containing pargasitic amphibole and irregular biotite platelets. The secondary leucocratic veins composed of oligoclase-microcline-quartz assemblages are also observed in the rock background.

The origin of these ultrabasics was diversely interpreted. Previously, they were regarded to the relics of primary gabbros which underwent multi-stage differentiation of basic melt. During the last event leucocratic melt was removed from the system (Finckh 1923). In the other author's opinion, these pyroxenites have been treated as products of basification in the contacts zone between granitoids and rocks of its metamorphic cover (Kowalski 1967) or considered as fragments of deep-seated crystalline basement transported by later moving of granite melt of Kłodzko-Złoty Stok Intrusion (Wierzchołowski 1976). Last results of structural studies of NE part of Śnieżnik Metamorphic Unit seem to indicate the genetic

[1] *University of Wrocław, Institute of Geological Sciences, Pl. M.Borna 9, 50-204 Wrocław, guniap@ing.uni.wroc.pl*
[2] *University of Wrocław, Institute of Geological Sciences, Pl. M.Borna 9, 50-204 Wrocław*

connection of studied pyroxenites with deep rift zone aged of late Caledonian of early Variscan (Wojciechowska 1988, Bakun-Czubarow 1989).

The aim of this study is to present preliminary results of geochemistry of pyroxenites within granitoids from northern part of Złote Mts. Some similarities of chemical features of studied rocks with pyroxenites from Sudetic ophiolitic suites are also discussed.

SCOPE AND METHODS OF STUDIES

Three samples of pyroxenites from different localities (outcrops on Haniak, Ptasznik hills and near Droszków village) were selected for chemical analyses. They represent fresh rocks without secondary leucocratic veins. All studied specimens were coarse-grained, black in colour and composed of primary clinopyroxene, brown common hornblende and olivine, whilst secondary biotite and pargasite occurred in subordinate amounts.

Bulk-rock analyses were carried out in Chemical Laboratory of Institute of Geological Sciences, Wrocław University using traditional wet method. Determinations of trace and *REE* elements were performed by means of: XRF, INAA and ICP in the Activation Laboratories Ltd. (Canada) with the valuable assistance from GEOANALIZA Enterprise (Cracow).

RESULTS

Studied ultrabasics on their normative composition are represented by clinopyroxenites with high values of magnesium number (#Mg) ranging from 74 to 84 and CaO contents between 10.61-15.40 wt.%. Most samples have low L.O.I (below 2 wt. %) reflecting small degree of secondary hydration, which commonly is assigned to interreaction between studied pyroxenites and with granite melt.

The MORB-normalized multielement diagram is close that of island arc-related ultramafic cumulates. They are characterized of high enrichment of the *LILE* and moderate depletion HFSE elements, probably originated by small degree of melting of less depleted mantle source composed of spinel peridotites. It may have taken place in the later stages of the oceanic crust development. Additionally, the similar distribution profiles are characteristic for coarse-grained (pegmatoidal) clinopyroxenites of Ślęża Mt. (Majerowicz, Pin 1992) or clinopyroxenites from Braszowice-Brzeźnica ophiolite suite.

The *REE* chondrite-normalized pattern exclude intra-oceanic nature of primary ultrabasic melts. The significant *LREE* enrichment (10–30 times chondrite value) may be caused probably by secondary granite melts, whilst the flattening of distribution profile in the range between *MREE* and *HREE* can be indicative low-level crystal fractionation.

CONCLUDING REMARKS

Summing up, it could may be generally accepted on the basis of preliminary results, that geochemistry of pyroxenites from Kłodzko-Złoty Stok granitic intrusion is comparable with chemical features of ultramafic cumulates characteristic for other Sudetic ophiolitic suites. We conclude that these ultramafic rocks were primarily products of large degree of partial melting at shallow depths and low-pressure fractional crystallisation at the bottom of the magma chamber. However, only results of detailed isotopic studies may give more information about primary nature of the studied pyroxenites.

REFERENCES

BAKUN-CZUBAROW N., 1989: Ultramafic rocks of the eastern part of the Polish West Sudetes. Guide book of excursions in Poland, 223–237. Wrocław–Potsdam.

CWOJDZIŃSKI S., 1977: Objaśnienia do szczegółowej mapy geologicznej Sudetów. Arkusz: Złoty Stok 1: 25 000, 3-81. Wyd. Geol. Warszawa.

FINCKH L., 1923: Die Stellung der Gabbros und Serpentine Niederschlesiens und ihre Beziehungen zu den Gneisen und den Graniten. Jahrb. Geol. Landesanst., 42, 825–838.

KOWALSKI W. M., 1967: Skały metamorficzne ze Złotego Stoku (Dolny Śląsk). Sprawozd. Geol. Kom. Nauk Geol. PAN., Oddział w Krakowie, 42, 7–77.

MAJEROWICZ A., PIN CH., 1992: The main petrological problems of the Ślęża Ophiolitic Complex, Poland. Zbl. Geol. Paleont., 9/10, 998–1018.

SMULIKOWSKI K., 1976: Ultramafic rocks from the vicinity of Złoty Stok (Lower Silesia). Bull. Polon. Acad. Sci. Ser. Sci. Terre, 3, 243–251.

SMULIKOWSKI K., 1979: Skała ultramaficzna z Droszkowa koło Kłodzka w Sudetach. Arch. Mineralog. 35 (2), 55–66.

WIERZCHOŁOWSKI B., 1976: Granitoidy kłodzko-złotostockie i ich kontaktowe oddziaływanie na skały osłony (studium petrograficzne). Geol. Sudetica. 11 (2), 3–143.

WOJCIECHOWSKA I., 1988: Outline of geological setting in the northern part of the Śnieznik metamorphic unit. In: I. Wojciechowska (ed.) Problems of geology and mineralization of the Snieznik Area. Wyd. Uniw. Wrocławskiego. 10–16. Wrocław.