Список літератури
1. Нікітенко І.С. Результати мінералого-петрографічного дослідження будівельного каміння з фундаментів Десятинної церкви у Києві / І.С. Нікітенко, Д.Д. Йолшин // Коштовне та декоративне каміння. – 2009. – №6. – С. 22–27.
2. Нікітенко І.С. Результати петрографічного дослідження фундаментів Спасо-Преображенського собору в м. Чернігові / І.С. Нікітенко, О.Є. Черненко // Геолог України. – 2013. – №2. – С. 147–154.
3. Атлас. Геологія і корисні копалини України: масштаб 1:5000000 / [М.М. Байсарович, В.Я. Веліканов, М.А. Бородулін та ін.]; гол. ред. Л.С. Галецький. – К.: Ін-т геологічних наук НАН України; УІЦПТ «Геос-XXI століття», 2001. – 168 с.
4. Обломочные породы Украины / [Ткачук Л.Г., Литовченко Е.И., Коваленко Д.Н. и др.] – К.: Наукова думка, 1981. – 352 с.
5. Строительные материалы Черниговской области / [сост. Г.Е. Горбачевский, Г.Н. Калинин, А.А. Шапочкина и др.]. – К.: Госстройиздат УССР, 1963. – 168 с.
6. Стратиграфія УРСР. В 11 т. Т. 9. Палеоген. / Д.Є. Айзенверг, В.Г. Бондарчук, О.К. Карпенко-Черноусова [та ін.]; гол. ред. В.Г. Бондарчук. – К.: Вид. АН УРСР, 1963. – 320 с.
7. Кулаковський П. Чернігово-Сіверщина у складі Речі Посполитої (1618 – 1648) / П. Кулаковський. – К.: Темпора, 2006. – 496 с.

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TYPOMORPHISM OF PERTHITIC INTERGROWTH OF FELDSPARS FROM GRANITIC PEGMATITES FROM THE AREA OF WEST AZOV (UKRAINIAN SHIELD)

Приведены данные о вещественном составе графических пегматитов с различной специализацией кварца и отмечено широкое развитие пертитовых вростков в полевых шпатах. Проанализированы типоморфные признаки пертитов и антипертитов и их генетическая информативность. Предложен вероятный механизм образования данных пород.

Наведено дані про речовинний склад графічних пегматитів з різною спеціалізацією кварцю і відмічено значне поширення пертитових зрощень у польових шпатах. Проаналізовано типоморфні ознаки пертитів та антіпертитів та їх генетична інформативність. Запропоновано ймовірний механізм утворення даних порід

The results of material composition of graphic pegmatite quartz with different specialization and noted the broad development perthitic intergrowths in feldspars. Analyses are given of typomorphic signs perthites and antiperthites and their genetic information content. We propose a probable mechanism of formation of these rocks.

The results of a detailed microscopic study of regular intergrowths of feldspar and quartz from granitic pegmatites of the West Azov Region (Ukrainian Shield) are provided here. The data collected on the material composition of graphic granite (pegmatite) with different specialization of quartz are collected and the extensive de-

velopment of perthitic intergrowths in feldspars and myrmekite effusion of quartz is recorded. Since the size, shape, and degree of perfection and pattern of distribution of perthites and antiperthites for most granitic formations are a strong typomorphic indication, also their genetic informational content is analyzed and probable mechanism of formation of these rocks is proposed.

As a result of a comprehensive study of the pegmatite deposits "Balka Bolshogo Lagerya" of Yeliseyevsky pegmatite field, the areas of graphic pegmatite of not clearly graphical, graphical and to a lesser extent pegmatoid, granular and block structure were studied, and the unique fancy varieties of graphic pegmatites were singled out. The main features of these rocks are a variety of color, relatively constant mineral composition (microcline - 50-75% quartz - 20-35% plagioclase - 3-15% biotite + muscovite - from 0 to 3%; ore - up to 1%; other minerals - up to 1%) and the presence of the original texture pattern, due to mutual intergrowth of microcline with crystals of quartz (ichtyoglipte). The major rock-forming minerals of graphical pegmatites - quartz and feldspars have been examined more in details.

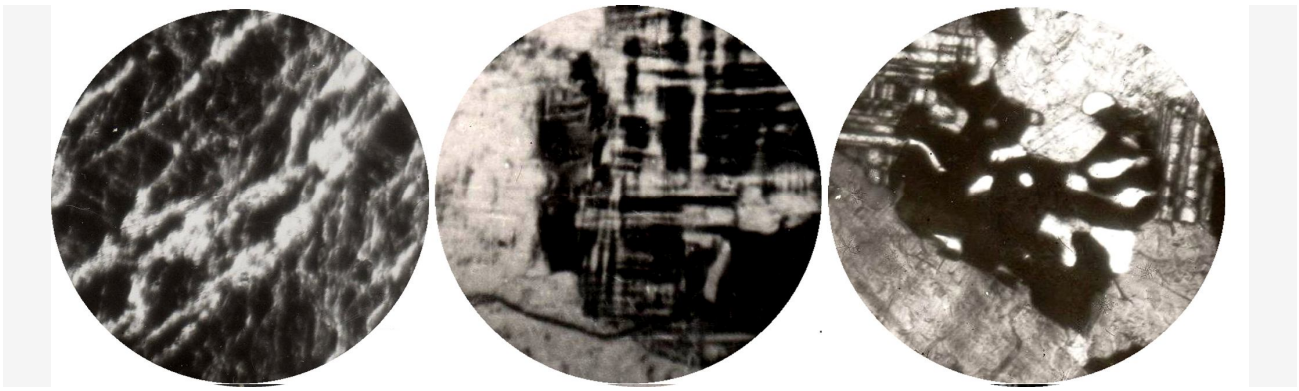
For these quartz rocks it is common to have specific inclusions of solid materials and volatile components, such as syngenetic inclusions of rutile and titanic iron ore (ilmenite), rarer of sphene or titanite and epigenetic fluid water and gas-water inclusions.

However, there are also rocks found, where quartz contains only fluid inclusions. Thus, all the studied pegmatites of the "Balka Bolshogo Lagerya" deposit are divided into pegmatites with rutile-ilmenite association of inclusions in quartz (titaniferous specialization) and pegmatites, where quartz does not contain inclusions of solids. For granitoid formations of the West Azov Region rocks with titaniferous, aluminum-titanium containing, aluminum, aluminum-lithium and aluminum-rare earth specialty, quartz is common [1].

For selected varieties of graphical pegmatites the formation of various double-feldspar intergrowths (Table 1) is typical, in studies of which morphological and genetic classification of perthites has been used and antiperthites Rudenko A.S. [2], developed on the basis of studies of pegmatites. In metamorphic and ultrametagennic rocks the same genetic types of feldspar intergrowths are observed. They vary a lot in size and shape of intergrowth of one type of feldspar into another, which complicates interpretation of their genesis [3]. Rough (massive) intergrowths are often referred to as metasomatic or recrystallized ones, and the thin aligned plates in (13.0.2) - to disintegrating or decomposing ones.

The bulk of perthitic intergrowths of studied granite pegmatites consists of cryptoperthite of disintegration, segregational and segregation-metasomatic (Fig. 1a), metasomatic micro-and macroperthites, rarer micro and macroperthites of recrystallization of the first kind. Various antiperthites of recrystallization (Fig. 1b) are frequently found among antiperthites, while metasomatic antiperthites are much less common. Usually, in a single flake several genetic types of feldspar intergrowths appear. In association with perthites and antiperthites myrmekites are frequent to be found (Fig.1, c), which are randomly oriented poikilitic inclusions of plagioclase, K-feldspar and other rock-forming minerals; porphyroblast (metacrystal) are sometimes present as microcline and plagioclase-isoperthites (Fig. 2, a).

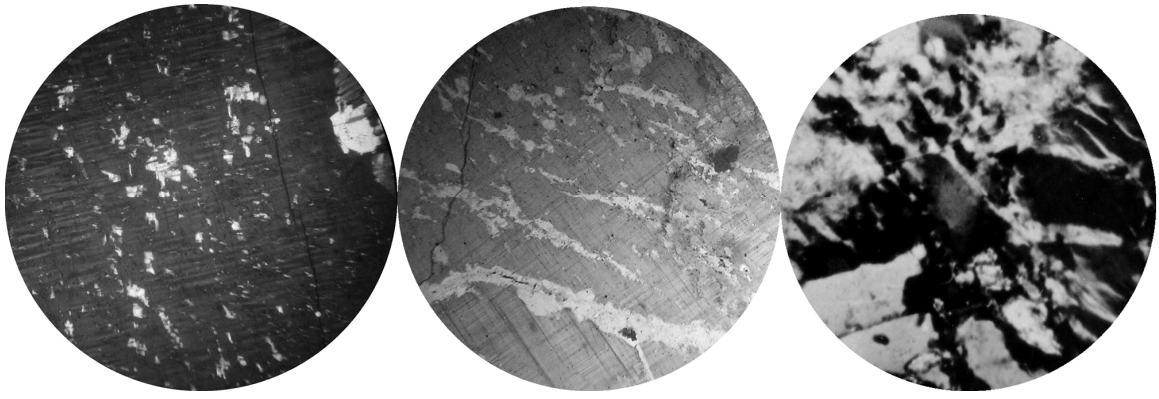
Thus, for the granitoids and graphical granites with titaniferous specialization of ore-forming medium of quartz, the vast majority of perthitic intergrowths are cryptoperthite of decomposition, at the account of which segregation perthites grow which also have extensive development. As a result of complications of segregation process by metasomatic phenomena, segregation-metasomatic microperthites are formed, which are expressed through the appearance of larger intergrowths of albite, and also in enveloping of foreign inclusions with albite in microcline (ichtyoglipte of quartz, poikilitic inclusions).



a b c

Fig. 1. Guartz-feldspar and feldspar intergrowths in granitic rocks of the West Azov Region: a) the segregation-metasomatic perthites; b) antiperthites of recrystallization; c) myrmekites

Throughout the area, almost in each microcline (K-feldspar) flake metasomatic perthites of the 1st kind are present in small amounts (up to 3%) (Fig. 2b) - albite intergrowths develop along the cracks of a split or along the periphery of the adjacent flakes of K-feldspar at the account of Sodium ions addition and potassium ions removal. Antiperthites of recrystallization of the 1st kind are widely spread and in a significant amount developed. They are formed due to transformation of fine-grained rocks (granite-aplites, granite-porphyry) into pegmatites, that is as a result of recrystallization.



a b c

Fig. 2. Feldspar intergrowths in granitic rocks of the West Azov Region: a) plagioclase-isoperthite of recrystallization; b) metasomatic perthites of recrystallization of the 1st kind; c) metasomatic perthites of recrystallization of the 2-nd and 3-rd kind

Table 1

Dissection of granitoids according to shape of perthitic intergrowth in feldspars

Specialty of environment	Perthite intergrowths	Form of allocation effusion	Size (mm)	(%)
Al + TR Al + Li	Metasomatic perthites of the 1st kind Metasomatic perthites of the 2nd kind Metasomatic perthites of the 3rd kind	Braid type perthites wedging out in one direction; lenticular-braid, wedging out in two directions; sinuous, branched, often repeating the form of cracks; fiery perthites	0,025- 1,5	5 - 50
Al	Metasomatic erthites of the 1-st kind	Braid type; lenticular-braid	0,025- 0,1	1 – 5
AL + Ti	Metasomatic perthites of the 1st kind	Braid type, lenticular-braid, branching, according to form of cracks;	0,025- 0,1	10–50
	Metasomatic perthites of the 2-nd kind	close to isometric or irregular	0,025 - 0,5	10
	Perthites of recrystallization	close to isometric, irregular	0,05 –0,2	10
	Perthites segregation-metasomatic	close to platy isometric, irregular	0,05- 0,2	1-5
	Antiperthites of recrystallization	discoid, lenticular, freckled and plate, irregular	0,025 –0,2	5
Ti	Cryptoperthite of disintegration	Needle type, discoid, columnar	0,01 – 0,02	20
	Segregation perthites	discoid, platy, lenticular irregular, tortuous,	0,02 –0 ,05	10
	Segregation-metasomatic perthites	plate type, repeating the form of poikilitic effusion;	0,025 –0,3	1 - 2
	Antiperthites recrystallization	Lamellar or columnar, spindle shaped isometric	0,01 – 0,5	25 – 30
	Metasomatic perthites of the 1st kind	Braid type, lenticular-braid type	0,025 – 0,3	1 – 5

At a certain stage the formation of antiperthites looks like the process of reduction of large intergrowths of microcline in plagioclase. In some cases, in a single flake of plagioclase both antiperthites and myrmekites are visible, alongside with randomly oriented flakes or grains of quartz. Sometimes platy antiperthites grow directly from cataclastic fine-grained main mass of rocks.

For granitoids with aluminum-titanium specialization, metasomatic perthites of the 1st and the 2-nd kind, perthites of recrystallization and, to a lesser extent, the segregation-metasomatic perthites and antiperthites of recrystallization of the 1st and the 2-nd kind are the most typical. Occasionally, porphyroblasts of microcline- and sodium-calcium feldspar of isoperthite which are typical structures of recrystallization. Metasomatic perthites of the 2nd kind (Fig. 2, c), as of the 1st kind, are widely developed and are formed by the replacement of microcline with albite along the cracks of a split, or from the periphery of the flake with a solid field, and further inside with wedging veins. Sometimes there are fiery perthites present. Perthites of recrystallization occur in pegmatites and granite gneiss. They are by nature of a simultaneously fading relics of plagioclase, enclosed in large flakes of microcline, branched out in the recrystallization process at the expense of smaller ones. Antiperthites of recrystallization, congruent with perthites of recrystallization, are typical relic structures of recrystallization, that is relicts of microcline in plagioclase.

For granitoids with aluminum medium, metasomatic perthites of the 1st kind are very insignificant, which are expressed in the appearance of individual intergrowths of albite, developed along the cracks of a split of K-feldspar.

Granitoids with aluminum-lithium and aluminum-rare-earth specialization are distinct in a wide development of metasomatic perthites of the 1st, 2nd and 3rd kind. They are characterized by effusion of albite along the cracks of the split, from the periphery of the flake with a continuous field into depth - in the form of wedging veins, as well as on the periphery of the adjacent flakes of K-feldspar. Formation of metasomatic perthites of the 3rd kind is connected with the destruction of the crystal trellis of microcline.

Under a special study of the intergrowth of feldspars in the pegmatites studied, except for perthites of disintegration and the segregation-metasomatic perthites of the 1st, 2nd and 3rd kind, there was a small number of syntactic perthites (Fig. 3a, b, c).

According to the researchers [5] variety of perthites of decomposition is connected with before-decomposing and decomposing dislocations, caused by growth and deformation tensions in crystals, and is also connected with the migration of dislocations, which designates the spatial arrangement of perthites. For magmatic rocks predominance of perthites of decomposition is typical, syntactic perthites, which used to be called eutectic are more developed in pegmatites.

Peculiarities of syntactic perthites are a wide variety of shapes and sizes of intergrowths, the presence of induction surfaces between the ingrowths and the ma-

trix, branching out of intergrowths, zonal and sectorial distribution in the matrix. Isometry, flatness or elongation of intergrowths is determined by the ratio of the growth rates of different faces of various simple forms of K-feldspar and plagioclase while crystallizing.

a b c

Fig. 3. Microcline with syntaxic perthites of albite: a) the model; b) photo of the microcline face {010} (2 cm) with protruding crystals of albite [4,5]; c) syntactic microperthites of albite in a microcline flake of graphic pegmatite

Thus, certain morphological and genetic types of two-feldspar and quartz-feldspar intergrowths identify recrystallization in rocks: primary recrystallization without gain-removal of alkali leads to the formation of granite gneisses and aplite-pegmatite granites, and the secondary one, with the additional gain of alkalis or without it - to the formation of microcline granites and graphic pegmatites.

References

1. Сливная Е.В. Расчленение гранитоидов зоны сочленения Среднеприднепровского и Приазовського блоков УЩ//Науковий вісник НГАУ, 2000. –№4. –С.44-46
2. Руденко С.А. Морфолого-генетическая классификация пертитовых страстаний//Зап. Всесоюз. Минерал. Общ.,1954. –LXXXIII. -№1. –С.23-36.
3. Заварицкий А.Н. Геологический и петрографический очерк Ильменского минералогического заповедника и его копей. М.: Глав. управл. по заповедникам, 1939. 318 с.
4. Попова В. И., Попов В. А., Поляков В. О., Щербакова Е. П.Пегматиты Ильменских гор. Свердловск: УНЦ АН СССР, 1982.- 48 с.
5. Попов В. А, Попова В. И., Поляков В. О. Закономерные срастания минера лов в пегматитах Ильменских гор/ЗРМО, 2006. – Ч.135. –вып. 5. –С.48-59.

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