Vestnik Otdelenia nauk o Zemle RAN, VOL. 4, NZ9001, doi:10.2205/2012NZ_ASEMPG, 2012

Study of solidus parameters of the Yaroslavka biotite and Voznesenka Li-F granites of the Primorye, experimental research

A. M. Aksyuk, A. A. Konyshev
Institute of Experimental Mineralogy of RAS, Chernogolovka

aksyuk@iem.ac.ru; konyshev@iem.ac.ru

Presents and discusses the experimental data obtained by the authors on the study of solidus of natural biotite and lithium-fluorine granites from the Voznesenka ore node in the Primorye. According to geological data these granites are close in age and belong to the Voznesenka complex. Biotite granites compose, apparently, the first phase, and Li-F – the second phase of the granites. This is confirmed by the experimental data, as solidus of biotite granite goes at higher temperatures at pressures below 300 MPa than solidus of lithium-fluorine granite, therefore, the last should have been for crystallize at lower temperatures. According to the mineral geofluorimeters the Li-F granites are characterized by high concentrations of fluoride in granite fluid, which is close to the typical Li-F granites of the Ta–Nb Orlovka and Etyka deposits in East Transbaikalia. The same deposits met and in the Voznesenka ore node. Solidus granite was studied experimentally in fluid with different fluoride concentrations. Fluorine contents were measured in the melt after experiments.

Key words: experiment, granite, solidus, fluorine, Yaroslavka, Voznesenka

Citation: Aksyuk, A .M., A. A. Konyshev (2012), Study of solidus parameters of Yaroslavka biotite and Voznesenka Li-F granites of the Primorye, experimental research, *Vestn. Otd. nauk Zemle*, *4*, NZ9001, doi:10.2205/2012NZ_ASEMPG

On the territory of the Voznesenska ore node, located on the South-West Primorye known fluorite, Ta, Sn, W, Be and other deposits, the formation of which is associated with Voznesenka granite complex. To this complex include two phases: biotite and litium-fluorine granites. According to geological data these granites are close in age and belong to the Voznesenka complex, but the biotite granite composes, apparently, the first phase, and Li-F – the second one. This is confirmed by the experimental data, as solidus of biotite granite takes place at higher temperatures than one of lithium-fluorine, therefore, the last should have been for crystallize at lower temperatures.

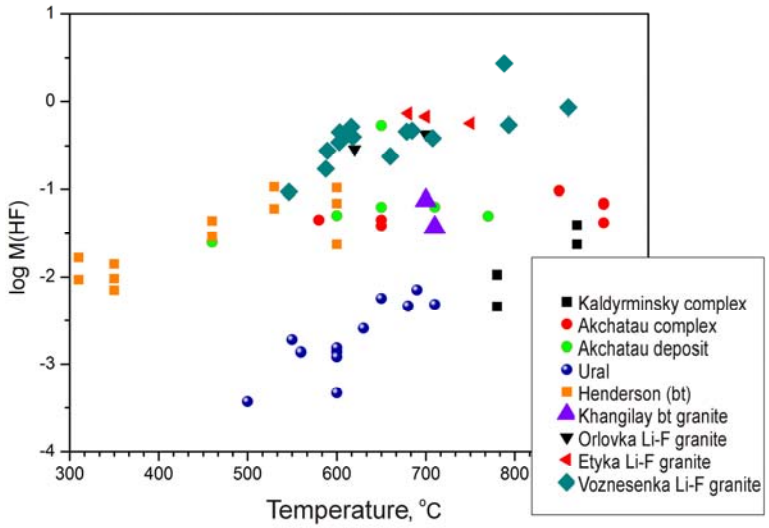

Fig. 1. Concentration of HF (M, mole/dm^3) in fluids of Voznesenka Li-F granites, defined with mineral geofluorimeters

According to the mineral geofluorimeters [*Aksyuk, 2002*] Li-F granites are characterized by high concentrations of fluoride in granite fluid of the Voznesenka ore node [*Ryazantseva, etc., 1994; Rub, Rub, 2006*]. Interestingly, these data are close to a typical concentrations of HF for Li-F granites of the Ta–Nb deposits Orlovka and Etykaa in East Transbaikalia (Fig. 1), which confirms the genetic affinity rare metal deposits of Voznesenka ore node and Eastern Transbaikalia. The increased concentration of fluorine in the melt and granite fluid leads to a shift of the melt composition to Li-F granite or greisens for already crystallized biotite granite, that explains the attribution by geologists them to one Voznesenka granite in view of the bad nakedness of the region.

According to experimental data solidus of biotite granites under pressure of 500 MPa are moving closer to the solidus of Li-F granite, which takes place at temperatures below or close to 600°C (Fig. 2).

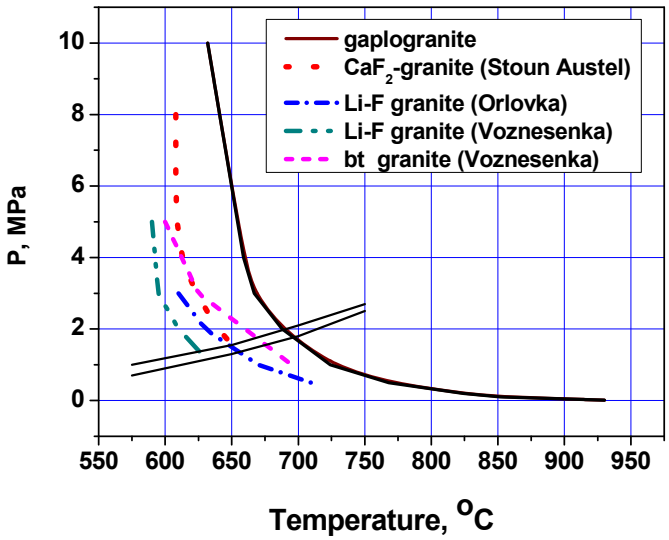

Fig. 2. Solidus of the Voznesenka biotite and Li-F granites in comparison with solidus of other granites

In the experiments with water content of F in the glass of Li-F granite is an average of 1–2 wt % according to the microprobe analysis (Fig. 3). In the ons with 0.1 m_{HF} it is on average 1–2.5 wt % F (Fig. 4). The contents of SiO_2 and F are were in the original granite on the data of x-ray-fluorescent analysis in the Li-F granite – 71.1 wt % SiO_2 and 1.3 wt % F, and in the Bt granite – 71.0 wt. % SiO_2 and 0.3 wt % F. Thus, after experiments content of F in the glass, and especially SiO_2 were noticeably increased.

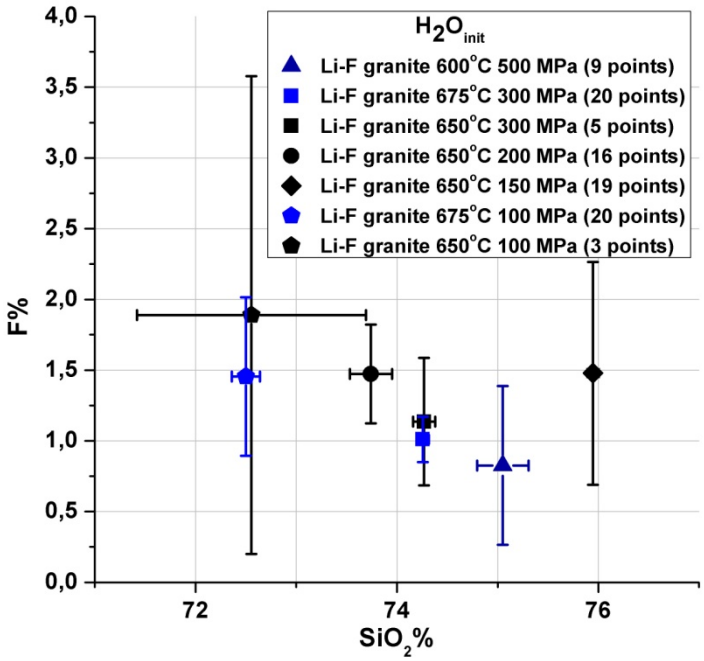

Fig. 3. The contents of F and SiO_2 (wt %) in glass of the Li-F granites after melting in H_2O

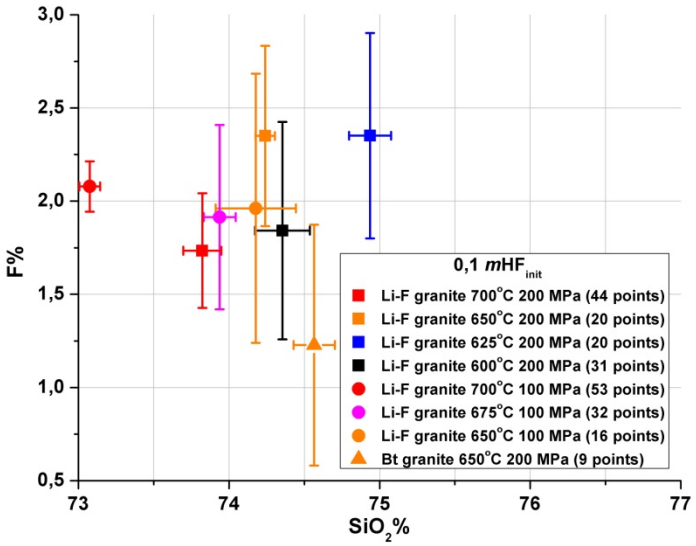

Fig. 4. The contents of F and SiO_2 (wt %) in glass of the Li-F and the Bt granites after melting in 0.1 m_{HF} initial

Although the accuracy of the determination of fluoride on a microprobe in glasses was relatively high, but, all the same, the main measured values were slightly higher than the baseline granite, i.e. the melting granites several accumulate fluoride and silica in the glass. From the results of the conversion of the experimental glass on normative compositions can be seen that the compositions of glass shifts to the side of the Or corner, and, for Li-F granite a little more (Fig. 5 and 6).

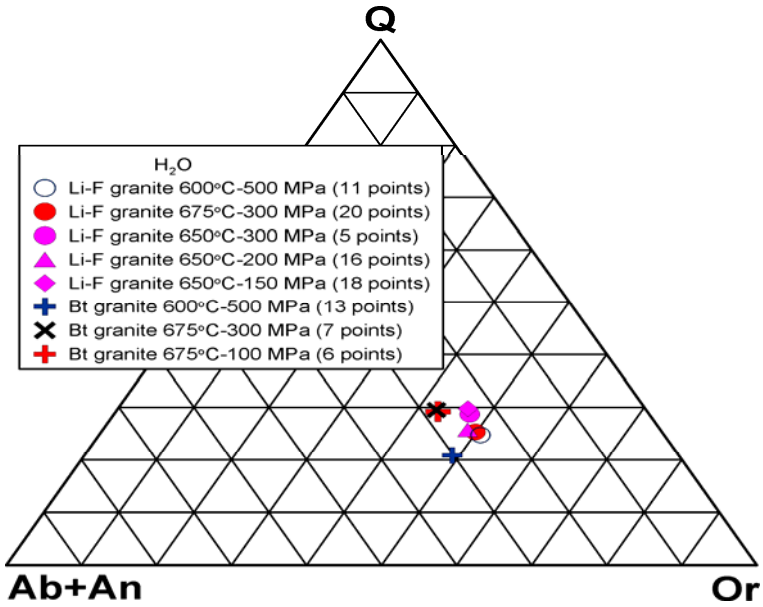

Fig. 5. Ab+Aq, Q, Or (wt %) in glass of the Li-F and Bt granites after melting in water

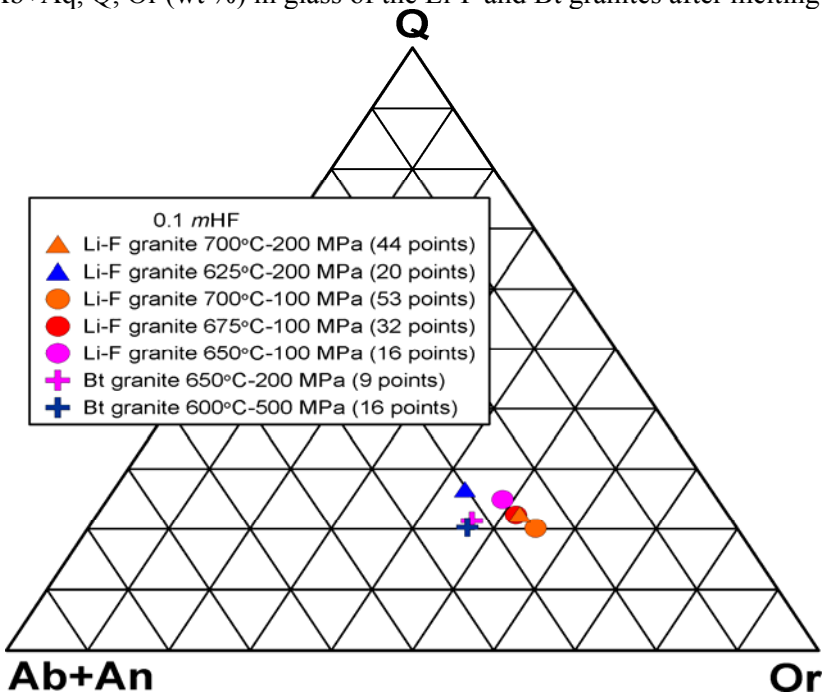

Fig. 6. Ab+Aq, Q, Or (wt %) in glass of the Li-F and Bt granites after melting in 0.1 m_{HF} initial

The work was supported by RFBR grant 10-05-00292 and Program ONZ-3.

Reference

Aksyuk, A. M. (2002). Experimentally calibrated geofluorimeters and estimation of fluoride in granite fluids, *Petrology*, v. 10, N 6, p. 628–642 (in Russian).

Ryazantseva, M. D., N. S. Gerasimov, I. N. Govorov (1994). Rubidium- strontium isochrone and petrogenesis of magmatic rocks of Voznesenka ore district (Primorye region), *Pacific Geology*, N 4, p. 60–73 (in Russian).

Rub, A. K., M. G. Rub (2006). Rare-metal granites of the Primorye, VIMS, M., 86 p. (in Russian).