

# EXPERIMENTAL INVESTIGATION OF THE SOLUBILITY OF THE ZIRCON WITH HIGH CONTENTS OF THE HAFNIUM IN HAPLOGRANITIC MELTS WITH FLUORINE

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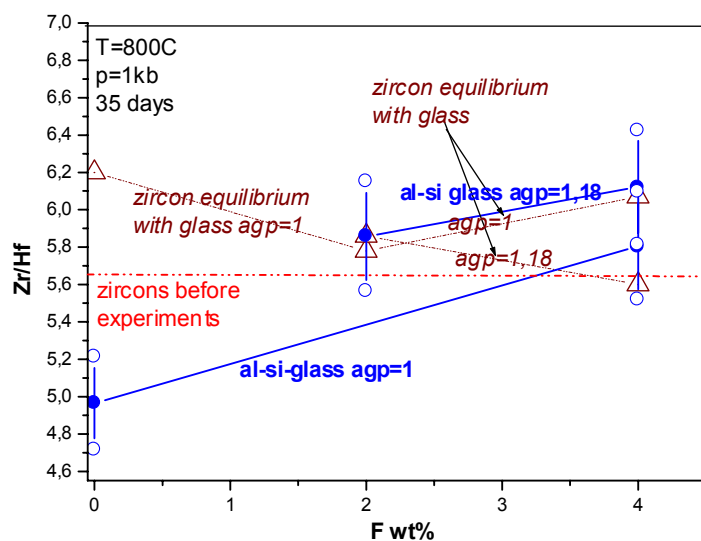
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**Key words:** zircon, hafnium, granite, melt, solubility, fluorine

Experiments on solubility of the zircon with high content of the hafnium have been obtained with goal of grounding the empirical geochemical indicator – the value of Zr/Hf ratio in fractionated granitic series. Value of the Zr/Hf ratio denote for the degree of the fractionation of granite melts. Evolution of the magmatic chamber by fractional differentiation lead to decrease of the Zr/Hf ratio from 45-50 in primary granitic melts to below 5 in last differentiates of granitic melts. Empirical index Zr/Hf is confirm for granites of Transbaikalia, Central Kazakstan, Erzgebirge [1].

## Experimental system and Methods

We synthesized zircons with high content Hf ( $Zr/Hf = 5,6/1$ ) by methodic V.S.Korjinskaya and prepare haplogranite gels with granitic composition with constant relation  $Na/K=1,63$ , support  $SiO_2=84,13$  mol.%, and apgaite coefficient equal 1 and 1,18. Compositions with fluorine were prepared by compose chemical agents. They have bulk fluorine contents 2 and 4 wt.%. Starting gaplogranite mixtures were saturated with 4 wt.%  $H_2O$  under  $T=1000$  °C,  $p=1$ kb,. Then we put the synthetic zircons into vessels and filled powder gaplogranitic glass. All experiments were performed in the Tuttle cold-seal pressure vessels inside of sealed Au capsules under  $T=800$ °C, 1kb,  $a_{H_2O}=1$ . The experiments were quenched and the runs products were analyzed by Electron Microprobe Analysis CamScan MV-2300 (IEM RAS) and Cameca ims-4f (IEI Yaroslavl). The duration of the experiments was 35-45 days.



**Fig. 1.** Zr/Hf relations in the haplogranite glasses and equilibrium zircons

## Results

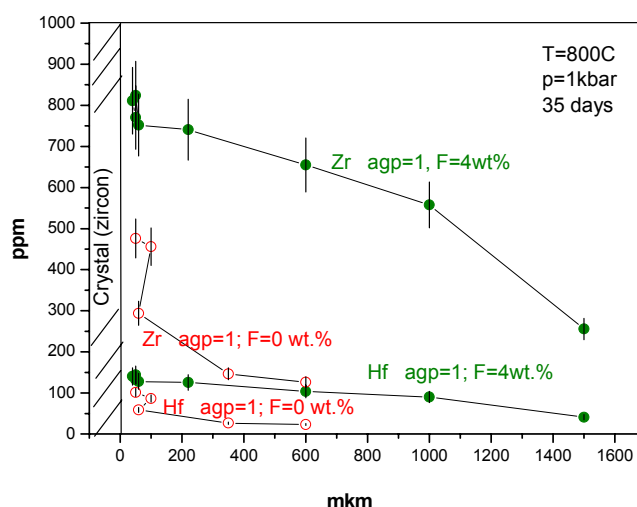
It was detect, that zircons recrystallized during experiment enriching ore depleting by hafnium. We can say, that value of the equilibrium relation Zr/Hf for glass and crystal differ for the system without fluorine and put within error in the system with fluorine. By our data fluorine didn't promote accumulation of the hafnium in the melt, at the same time solubility of the Zr and Hf increase in the melt in the system with fluorine (tabl.1). More effective factor increased solubility Zr and Hf in the melt is value of the apgaite coefficient (the  $(Na_2O+K_2O)/Al_2O_3$  (mol.) relation in the melt) than fluorine contents (tabl.1).

**Table 1.**

Solubility of Zr and Hf in the granitic melts (ppm).

K <sub>agp</sub>	Element	Contents F, wt. %		
		0	2	4
1,00	Zr	466±47 ppm	-	789±79 ppm
	Hf	94±9 ppm	-	136±14 ppm
1,18	Zr	-	16800,5±160 ppm	24400±2440 ppm
	Hf	-	2868±287 ppm	3985±399 ppm

We accounted the coefficients of diffusion Zr and Hf diffusion in the granitic melt (tabl.2). The obtained coefficients were based on the data of the experimental concentration profile of the Zr and Hf in the quenched glasses (fig.2). In the calculation we used model of the one-dimensional diffusion from constant spring.

**Fig.2.** Diffusion profiles of the Zr and Hf in the granitic melts**Table 2.**Values of the diffusion coefficient of the Zr and Hf in the haplogranite melts (cm<sup>2</sup>/s)

K <sub>agp</sub>	Element	Content F, vec. %		
		0	2	4
1	Zr	1,859E-08	-	9,021E-07
	Hf	1,652E-08	-	6,430E-07
1,18	Zr	-	3,973E-10	6,929E-09
	Hf	-	3,483E-10	-

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## Reference:

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