

## **The Zr/Hf Ratio in Granites as Indicator of Felsic Magma Fractionation**

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The total Zr/Hf ratio of the rock is a valuable indicator of magmatic fractional crystallization and rare metal specialization of felsic magma. The evolution of Zr/Hf ratio in rare metal granites is discussed on examples from three regions with different types of mineralization: Erzgebirge/Krusne Hory Mts. (Sn-W), Central Kazakhstan (W-Mo), and Transbaikalia (Ta-Nb). The Zr/Hf ratio decreases during magmatic evolution from 45-40 for granodiorite and adamellite to 35-20 for biotite granite, 30-15 for leucogranite, 15-5 for Li-F granite in the all three areas under consideration. Similar relations are typical of other regions too. It is noteworthy that trend of magmatic fractionation has a well-defined extreme in the SiO<sub>2</sub> – Zr/Hf diagram. On its way from granodiorite to leucogranite (Zr/Hf index from 40 to 25) SiO<sub>2</sub> concentration in the rocks increases whereas on its further way from leucogranite to Li-F granite (Zr/Hf index from 25 to 5) SiO<sub>2</sub> concentration in the rocks decreases. The reason is the shift of granite eutectic from more quartz to more feldspar (largely albite) composition as fluorine concentration increases in the residual felsic melt. Granites which have value of Zr/Hf index more than 25-30 are not perspective for any rare metal mineralization. Sn-W and W-Mo types of rare metal mineralization are related with leucogranites and Li-F granites which have value of the Zr/Hf ratio from 25 to 5. Ta-Nb mineralizaion is typical for the most evolved rare metal felsic rocks like albite-amazonite Li-F granite ("apogranite"), aplite and pegmatite of Orlovka and Etyka tantalum deposits of Eastern Transbaikalia in which the Zr/Hf index decreases to 5 and below.