Geophysical Research Abstracts
Vol. 14, EGU2012-5679, 2012
EGU General Assembly 2012

Zircon and monazite patterns resulted from late- to postmagmatic fluid-interaction processes in granitoid pluton and related rhyolitic bodies

K. Lisowiec (1), B. Budzyń (2), E. Słaby (3), A.D. Renno (4), and J. Götze (5)

(1) Deparment of Geology, University of Warsaw, Poland (klisowiec@student.uw.edu.pl), (2) Institute of Geological Sciences, Polish Academy of Sciences, Kraków, Poland (ndbudzyn@cyf-kr.edu.pl), (3) Institute of Geological Sciences, Polish Academy of Sciences, Warsaw, Poland (e.slaby@twarda.pan.pl), (4) Helmholtz-Zentrum Dresden-Rossendorf, Dresden, Germany (a.renno@hzdr.de), (5) Institute of Mineralogy, TU Bergakademie Freiberg, Germany (goetze@mineral.tu-freiberg.de)

Zircon and monazite from the peraluminous Stolpen granite and related rhyolitic dyke show magmatic as well as post-magmatic textures. The magmatic textures represented mostly by subtle oscillatory zoning are overprinted by post-magmatic fluid interaction which is indicated by elevated contents of Y, P, Th, and U and dissolution textures in altered zircon domains. Late- to postmagmatic fluid-induced crystallization can be divided into two main stages separated by a strong dissolution event: 1st - the formation of Y-, P-, Th- and U-rich rims and 2nd - purification of these domains by trace element release which led to the formation of secondary xenotime and huttonite/thorite. This can be observed both in the granite and its aplitic parts and rhyolite. Patchy zoning in primary monazite from the granite also suggests fluid-induced alterations. Its formation could resulted from the coupled dissolution-reprecipitation processes. Dark patches are depleted in Th, U and Pb which is interpreted as a result of selective removal of these elements from the monazite structure. Beside modification of monazite composition, partial dissolution of monazite grains occurred as well indicating the aggressive character of the fluids. Monazite grains from the rhyolite show slightly different textures and composition. High Ca, Pb, and Si contents and depletion in Th, as well as porous, spongy textures are results of fluid-induced alterations that caused also crystallization of cheralite. Grains with pure monazite composition cannot be found.

Zircon and monazite from the granite are accompanied by fluorite, Y-rich and Nb-rich minerals. High abundance of fluorite suggests elevated fluorine concentration in the fluids which facilitated both the dissolution of zircon and monazite grains and removal of certain elements from their structure. The absence of fluorite in the rhyolite indicates a different nature of the fluids involved in the alteration processes however the porous textures of zircon and monazite suggest their high reactivity as well.

The alteration of primary, magmatic accessory minerals and formation of secondary minerals is interpreted as related to magmatic fluids, which origin cannot be defined precisely on the base of the present data. However their composition (high F-, Y- and Ca- activity) and the mineralogy of the accessory phases suggest that they weren't derived only from the parental magma itself.

Key words: zircon, monazite, accessory minerals, fluid interaction, Stolpen Granite, rhyolite