Quartz to ballen quartz transformation in the Jänisjärvi impact structure

Zamiatina D A[@], Zamyatin D A, Mikhalevskii G B, Bylatov V A and Chebikin N S

Zavaritsky Institute of Geology and Geochemistry of the Ural Branch of the Russian Academy of Sciences, Akademika Vonsovskogo Street 15, Ekaterinburg 620016, Russia

[@] d.zamyatina@gmail.com

Pressures of 60 GPa and temperatures of 750 °C [1,2] were achieved in the Jänisjärvi impact structure due to meteorite fall (Karelia, Russia). Ballen quartz aggregates surrounded by cristobalite in impact melt rocks of the Jänisjärvi meteorite crater have been studied by electron microanalysis (EBSD—electron backscatter diffraction; EPMA—electron probe micro-analyzer; CL—cathodoluminescence; EDS—energy dispersive spectroscopy; BSE—backscattered-electron one) and Raman spectroscopy. EBSD maps show that ballen quartz is presented by aggregates of disoriented spherical crystal grains. These arose as a result of impact, during the rapid heating of the substance and the phase transition of quartz into diapletic quartz glass, then into quartz, and with a decrease in temperature again to quartz [3]. The relict ballen quartz formed during shock heating distinguished, as well as regions subjected to post-shock hydrothermal action with the appearance of a significant amount of impurities in quartz.

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