Baddeleyite from Paleoproterozoic Cu-Ni and Pt-Pd reefs of oceanic and continental crust (N-E part of the Fennoscandian Shield, Arctic region)

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Baddeleyite is most important mineral compared with zircon for precise U-Pb dating mafic-ultramafic rocks (Heaman, LeCheminant, 1993, Schaltegger, Davies, 2017). Baddeleyite from verlites of Zhdanovskoe open pit Cu-Ni Pechenga largest deposit are located of the Central-Kola megablock gave U-Pb age 1980±2 Ma. In additional similar Sm-Nd isochron age on sulfides and rock-forming minerals have been measured with 1965±87Mafor the same rocks. These isotope data are a very similar ages of the famous Bushveld complex (Mungall et al., 2016 , Latypov et al., 2017). Youngest U-Pb age with 1881±9 Ma has been obtained on baddeleyite from clynopyroxenite of Kolvitsa Ti-Mgt deposit from Kandalaksha-Kolvitsa zone. Nevertheless systematically Sm-Nd isotope data for the country rocks from the two ore regions are reflected 2.3-2.5 Ga and suggested about presence of juvenile paleoproterozoic oceanic crust according to εNd value from +2 to + 5. The features of the baddeleyite crystals are characterized by absence of zircon rims and U-Pb system are a very preserve and coordinate points lie on the Concordia line. According to new LA-ICP-MS data for REE distributions and concentrations of Ti and Zr from accessory minerals after (Watson et al., 2006) there are mostly suggested about high closing temperatures (almost 1000˚C) of U-Pb system in baddeleyite compared with zircon.

Single grains of baddeleyite were separated from gabbronorites, anorthosites and dykes complexes of the layered intrusions from Monchegorsk ore refion with Cu-Ni and Pt-Pd reefs, low sulfides Fedorovo-Pansky massif with Pt-Pd reefs (MItrofanov et al., 2013, Chashchin et al., 2016) and Cr-Ti-V Imandra lopolith of the Central Kola megablock. All these giant deposits and ore regions are formed or have at the basement continental crust with TTG and grey gneisses of Eoarhaean and Paleoarhaean U-Pb zircon ages from 3.7 to 3.1 Ga (Bayanova et al., 2016). Precise U-Pb ages on single zircon-baddeleyite grains from the main gabbronorite phases of the Cu-Ni and Pt-Pd reefs of the 3 regions yielded 2.5 Ga. The second impulse with 2.45 Ga of magmatic activity with Pt-Pd reefs are connected with anorthosites from the layered intrusions of the Fedorovo-Pansky and Monchegorsk ore regions due to U-Pb data on baddeleyite-zircon gechronometer. Isotope Sm-Nd dating sulfides minerals from the gabbronorite and anorthosite the same massifs have a coeval ages with U-Pb data. Baddeleyite from gabbronorite dykes complexes of the Imandra lopolith with U-Pb age 2.4 Ga data are finale of the more than 100 Ma plume basite-ultrabasite primary fertile (EM-1,OIB, E-MORB, N-MORB) reservoirs of superlarge multimetal deposits with unique reefs (Bayanova et al., 2009, 2014, Nerovich et al., 2014, Yang et al.,2016, Huhma et al., 2018).

Features of baddeleyte crystals from Pt-Pd and Cu-Ni reefs on continental crust are characterized by less preserve U-Pb systems and points of coordinate have a small discordances. New LA-ICP-MS researches REE and closure temperatures in U-Pb system using Ti and Zr concentration in grains are suggested about low (850-900˚C) temperatures of crystallization compared with baddeleyite from Cu-Ni reefs which origin in oceanic crust. Studies of PGE concentrations by laser ablation techniques on sulfides minerals implied more Pd in pyrite and Pt in pyrrhotite from the Cu-Ni and Pt-Pd reefs in oceanic and continental crust (Mitrofanov et al., 2013).

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