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Uranium-lead dating of perovskite from the Afrikanda plutonic complex (Kola Peninsula, Russia) using LA-ICP-MS.

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Perovskite ($CaTiO_3$) is a common early crystallizing accessory phase in a variety of alkaline rocks, and has been shown to contain enough U and Th for U-Pb dating. U and Pb analysis of perovskite has been primarily carried out using the SHRIMP or ID-TIMS techniques, and the resulting U-Pb dates commonly yield the emplacement age of the host rock. To our knowledge, only one U-Pb study of perovskite has been done using the LA-ICP-MS (Cox and Wilton, 2006). Some of the advantages of this method over the SHRIMP and ID-TIMS techniques include greater speed and lower cost of analysis.

In this work, the U-Pb ages of perovskite from the Afrikanda plutonic complex (Russia) were obtained *in situ* using the LA-ICP-MS. The measured $^{238}U/^{206}Pb$ and $^{207}Pb/^{206}Pb$ ratios were corrected for time-dependent mass-bias using the well-calibrated zircon standard GJ-1 (608.5 $\pm$ 0.4 Ma; Jackson et al., 2004). On a Tera-Wasserburg diagram (Tera and Wasserburg, 1972) the analyses of perovskite from two magmatic phases (clinopyroxenite and carbonatite) plot in separate clusters. Although the variations in the $^{238}U/^{206}Pb$ and $^{207}Pb/^{206}Pb$ ratios within each group are small, there is enough dispersion between the two clusters to obtain a reasonably precise age of 375 $\pm$ 13 Ma (2σ; MSWD = 0.23), which strongly suggests that the carbonatitic rocks are broadly coeval with the clinopyroxenite. The only other isotopic study on the Afrikanda Complex was done on a clinopyroxenite using the Rb-Sr method and yielded a whole rock-mineral (perovskite, biotite, augite and apatite) isochron age of 364.0 $\pm$ 3.1 Ma (2σ; MSWD = 0.72). This age is within error of our U-Pb date, which demonstrates that LA-ICP-MS-based U-Pb dating of perovskite can serve as a reliable geochronological tool.

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