Controls on element exchange in ultramafic-hosted plumasite-type corundum, South-East Greenland

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We collected samples from corundum (Al_2O_3) occurrences in the Tasiilaq area, South-East Greenland, and compared field-based observations with geochemical data to better understand element exchange mechanisms between ultramafic rocks and metasomatism by pegmatitic fluids during corundum formation. A transect through the plumasite mineral reaction series indicates that the pegmatite contributed Si, Al, Na, Ca, K, Fe, and Ti to the minerals formed, and the ultramafic rock Mg, Fe, Ti, P, Mn and some Ca. The ultramafic rocks are grouped into two types; a high-Ti and a low-Ti group. The low-Ti group is more depleted in all elements except for Mg and Si compared to the high-Ti group. Corundum from South-East Greenland shows pinkish to violet color and contains high trace element conc. of Fe, Cr and Si and moderate conc. of Mg, Ti, Ga, V and detectable amounts of Sn, Mn, Ge and Sr. Trace elements and O-isotopes in corundum differ between the two groups. The corundum from the low-Ti group has higher $\delta^{18}O$, higher Fe, Ti and lower Ga than the high Ti-group. The ultramafic rocks have $\delta^{18}O$ signatures of 4.99‰ in the low-Ti group, and 3.89‰ in the high-Ti group. The $\delta^{18}O$ signatures in the corundum are inherited from the two groups of ultramafic rocks that have values of 4.86 and 2.61‰, respectively. The pegmatite associated with corundum formation has a U/Pb zircon age of 1872±11 Ma, which is comtemporary with the timing of deformation and collision between the North Atlantic Craton and Rae Craton in South-East Greenland during the Nagssugtoqidian orogeny.

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