

Discovery of a CaIrO_3 -type Al_2O_3 phase that implies crust-mantle recycling in ophiolite-hosted corundum from the Luobusa ophiolite, Tibet

Fahui Xiong^{1,2}, Xiangzhen Xu¹, Jingsui Yang¹, Richard Wirth³, Yildirim Dilek⁴

¹Center for Advanced Research on the Mantle (CARMA), Key Laboratory of Deep-Earth Dynamics of Ministry of Land and Resources, Institute of Geology, Chinese Academy of Geological Sciences, Beijing 100037, China, xiongfahui@126.com

²Key Laboratory of Depositional Mineralization & Sedimentary Minerals (SDUST), Shandong University of Science and Technology, Qingdao 266590, China

³Helmholtz Centre Potsdam, GFZ German Research Centre for Geosciences

⁴Department of Geology and Environmental Earth Science, Miami University, Oxford, OH 45056, USA

Diamonds and other ultrahigh pressure (UHP) minerals have been reported previously from the Luobusa ophiolite of Tibet, but these minerals have thus far been found only as individual grains. Here we report the occurrence of the natural CaIrO_3 -type (post-perovskite-type) Al_2O_3 as an inclusion in Ti-N minerals which is the inclusion in corundum, both of which were recovered from chromitite. The inclusions were captured in the corundum which retaining the original structure. These occurrences confirm the presence of UHP minerals in the Luobusa chromitite, requiring minimum pressures of ~20 GPa. These observations suggest that the formation of corundum and podiform chromitites is a multi-stage process. Magnesiochromite grains and perhaps small bodies of chromitite crystallized deep in the mantle under low ambient $f\text{O}_2$ from partial melts of peridotite.