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Diamond Discovered in Dangqiong Ophiolite, Western Yarlung-Zangbu Suture Zone, Tibet

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The first diamonds from ophiolite were found in peridotite of Luobusa ophiolite along Yarlung Zangbu suture zone in Tibet, China (IGCAGS, 1981), and then more and more diamonds found in harzgurgite (Bai et al., 1993; Yang et al., 2007a; Robinson et al., 2014; Xu et al., 2008, 2009; Yang et al., 2011); Furthermore, more diamonds, native elements and metal alloys found from chromitites of the Ray-Iz ophiolite of the Polar Urals, Hegenshan chromitite and Sartohay chromitite (Yang et al., 2007b, 2011, 2015; Tian et al., 2015, Huang et al., 2015). They have been explained as one effective way to transport these diamond-bearing peridotites and chromitites to shallow mantle depths is by plumes or superplumes and identify as the ophiolite diamond (Yang et al., 2014). The diamonds and the mineral inclusions that provide samples of materials show these ophiolite daimonds are different with the best-known diamonds and the ones of most commercial importance are from kimberlites and lamproites and UHP metamorphic diamonds (e.g. Liou and Tsujimori 2013), even the microdiamonds from the Meteorites and terrestrial impact craters (Koeberl et al., 1997; Karczemska et al., 2009).

The Dangqiong ophiolite is the large ophiolite found along the western segment of the Indus-Yarlung Zangbo Suture. This ophiolite is characterised by the occurrence of a large peridotite body (ca. 700 km^2) with some associated crustal rocks, which tectonically overlies an Upper Cretaceous mélange that includes a wide variety of exotic sedimentary and volcanic blocks (Yang et al., 2011). The mantle sequence consists of cpx-harzburgite and minor dunites. Locally, magmatic veins with compositions ranging from pyroxenite to gabbronorite cross-cut the mantle peridotites. At the base is a thin mélange zone containing dismembered volcanic rocks and metamorphosed Triassic shallow- bathyal carbonate-clastic rocks or Shale. On the southwester it is contact with fault by volcanic rock and on the southeast it is thrust over the Triassic carbonaceous slate.

Various combinations of zircon, quartz, corundum, rutile, titanite, almandine garnet, kyanite, andalusite, and coesite have been recovered from podiform chromitites of the Dangqiong peridotite. More than 20 grains of diamond have been recovered, most of them are pale yellow, others are colorless, reddish-orange from Dangqiong peridotite. The grains are all 100–200 μm in size and mostly anhedral with a range of morphologies including elongated grains, octahedral or subhedral, and some grains have well-developed striations. The characteristic Raman spectra with a shift between 1325cm^{-1} and 1333 cm^{-1}, mostly with a shift at 1331.51 cm^{-1} or 1326.96 cm^{-1}. Integration of all data from Yarlung-Zangbu Suture Zone. These observations suggest that the formation of these ophiolites is a multi-stage process. Magnesiochromite grains and perhaps small bodies of chromitite crystallize very deep in the mantle. UHP minerals and highly magnesian olivine and pyroxene inclusions are trapped in these magnesiochromite grains. When oceanic crustal slabs are trapped in suprasubduction zones (SSZ), they are modified by island arc tholeiitic and boninitic magmas, which change the magnesiochromite compositions and deposit chromitite ores in melt channels.

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