ARCHEAN AND RELATED Zn-BEARING CHROMITES: PLANETARY AND GEOTECTONIC IMPLICATIONS

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The considered Zn-bearing chromites (ZnCr: ZnO 1 to 10 wt.-%) have characteristic optical properties and crystallo-chemical signatures due to special contents and relationships of Mg-Fe2+, Cr-Al-Fe3+, Zn, Mn and Ti. Their magmatic crystallization occurs under reducing conditions at low fS2. They occur worldwide, from archean/prearchean through phanerozoic times in various geotectonic environments. ZnCr occur in most greenstone belts, including the Isua supracrustals as the oldest example, as the characteristic magmatic accessories of a specific group of peridotitic komatiites (PK). They occur also as detrital heavy minerals in most archean and palaeoproterozoic gold-bearing quartz-pebble conglomerates, including those conglomerates that furnished the oldest zircons yet dated. ZnCr occur in iron meteorites, but are unknown in chondrites. They are rare as inclusions in kimberlite diamonds. Sporadically they occur in alpine ultramafics and associated podiform chromitites (normal chromite: ZnO 0.5 wt.-%) of ophiolites, particularly in those with sporadical diamonds (or graphite pseudomorphs) as some Turkish occurrences and the Oman ophiolite. The speculative history linking these observations starts with prearchean planetary fusion and core formation (ZnCr of iron meteorites). It continues with archean PK greenstone belt magmatism and lithospheric underplating at depths near the upper limits of (later) diamond formation. It ends in the Phanerozoic with Kimberlites sampling diamonds with ZnCr inclusions and the incorporation of old archean mantle (with ZnCr and diamonds) in deep rooted ophiolites under plate tectonic regimes.