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Chromite ore deposits from Sorkhband ultramafic sequence, Faryab, southern Iran

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Faryab chromite ore deposits are located in 135 km northeast of BandarAbbas and 30 km west of Manujan city, south of Iran. There are several chromite ore bodies (10 active mines) which occur in a long and narrow zone in the Sorkhband ultramafic sequence. The ultramafic sequences are bordered to the east and northeast to an Early Paleozoic metamorphic complex by a reverse fault (the Rudan fault), and is bordered to west-southwest to a Mesozoic ophiolitic complex by another reverse fault (the Dastgerd fault). Although, the Paleozoic metamorphic complex is a part of NW-SE trending Sanandaj-Sirjan structural zone but the Sorkhband ultramafic sequence and the ophiolitic complex are probably a part of W-E trending Makran zone. There are several ophiolite terrains in Iran such as northern Iran along Alborz mountain range, Zagros suture zone which are apparently the extension of the Oman ophiolites, Sanandaj-Sirjan and Makran zones including Sorkhband and Rudan, eastern Iran and Central core of Iran area. Principal chromite ore deoposits mainly occur in the last three types. The ophiolites of Iran are a part of Tethyan ophiolite belt of the Middle East which links to Pakistan ophiolites to the east and Mediterranean ophiolites to the west and the Oman ophiolite to the south.
The Faryab chromite ores are the largest chromite deposits in Iran. The Faryab chromite ore deposits have proven and estimated resources of about 30 Mt with an economic grade (more than 30 % Cr_2O_3). The ores occur as discontinuous lens and layers trending NE-SW. The lenses and layers are various in size from centimeter to kilometer. The Faryab chromium mines are larger than common alpine-type chromite mines but their other features show that they are related to the ophiolitic sequence and therefore belong to the alpine-type chromites. The Sorkhband complex is geologicaly divided into northern part and southern part. The southern part composed mainly of harzburgite and minor dunite and rarely chromite lens. The northern part composed of dunite, olivine clinopyroxenite, wherlite, harzburgite, olivine websterite, websterite and large chromitite lens. Chromitites are restricted to dunite both on hangingwall and footwall sides in all the mines. The ultramafic rocks consist of forsterite, clinopyroxene, orthopyroxene, and chromite which were partially altered to serpentine, magnesite, talc and minor uvarovite.
The chromitite shows various textures such as massive, layered, nodular, dissiminated and cataclastic. The mafic minerals and chromite from the Sorkhband sequences were analyzed by an automated JEOL JXA-8600 Superprobe of Yamagata University with accelerating voltage of 15 kV and a beam current of 20 nA. Harzburgite contains chromite with Cr# = 33.09 to 40.14 and TiO_2=0.01 to 0.1 wt. %, olivine (90 to 92 % Fo), orthopyroxene (89 to 90 % En) and clinopyroxene (95-96 % Di). The mineral chemistry indicating that the harzburgite is a depleted rock from

MORB type melts. Chromitite contains chromite with Cr# about 81, MgO=9 to 20 wt. %, Cr_2O_3)=45 to 62 wt. % and TiO_2<0.19 wt %. This type of chromitite is similar chromitite that formed in a supra-subduction zone by interaction of boninitic melts and harzburgite in the mantle section of ophiolitic sequence.

Keywords: chromite, ultramafic sequence, Iran, ophiolite