СВИДЕТЕЛЬСТВА ВЗАИМОДЕЙСТВИЙ ПОРОДА-РАСПЛАВ ПРИ ПЕТРОГЕНЕЗИСЕ ВЕРЛИТОВ УЛЬТРАБАЗИТОВОГО КОМПЛЕКСА СОРХБАНД (ЮЖНЫЙ КЕРМАН, ИРАН): ОГРАНИЧЕНИЯ ПО ГЕОХИМИИ МИНЕРАЛОВ И ВАЛОВОМУ СОСТАВУ ПОРОД

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EVIDENCES OF MELT-ROCK INTERACTION DURING PETROGENESIS OF WEHRLITES FROM SORKHBAND ULTRAMAFIC COMPLEX, SOUTHEN KERMAN, IRAN: CONSTRAINTS ON MINERAL AND WHOLE ROCK CHEMISTRY

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The Ordovician Sorkhband ultramafic complex lies in the southern Kerman Province of Iran (Fig.1, a). The wedge shape complex covers an area of more than 100 km^2 and is divided into lower and upper parts. The former comprises of dunite, podiform chromitite deposits (Faryab mine, largest in Iran), massive and dyke like olivine clinopyroxenite, wehrlite (as bands with width of 0.5-5 m and a few meters long) and olivine websterite dykes. The upper part consist of foliated porphyroclastic diopsidic harzburgite with subordinate lenses and dykes of dunite, massive and dyke like olivine clinopyroxenite and minor orthopyroxenite dykes with no significant chromitite mineralization (Fig.1, b).

According to petrographical studies, wehrlites show granular textures with variable modal composition which consist mainly of 40-70 % olivine (Fo90-91), 20-50 % diopsidic clinopyroxene, 1-10% bronzitic orthopyroxene and < 1 % chromite (Cr#=65-67, Mg#=44-46). Some olivine minerals show evidences of recrystallization as triple junction with other minerals (Fig. 2, a), deformation lamellae along its slip planes, mini kinking and irregular extinction band configurations, whereas clinopyroxene minerals are deformed and often exhibit exsolution lamellaes of orthopyroxene.

Mineral chemistry of olivine, clinopyroxene, orthopyroxene, and chromites in wehrlites are similar to olivine clinopyroxenites and reveal a mantle origin for the Sorkhband ultramafic complex. Moreover, chondrite normalized rare-earth element (REE) patterns of wehrlites show flat medium REE (MREE) and heavy REE (HREE) patterns, [(Gd/Yb)N~1], and highly light REE (LREE) depletions similar to olivine clinopyroxenite patterns. Furthermore, platinum group element

(PGE) show highly differentiated pattern in wehrlites with a positive slope (similar to olivine clinopyroxenites) and high Pd/Ir ratio (36-59).

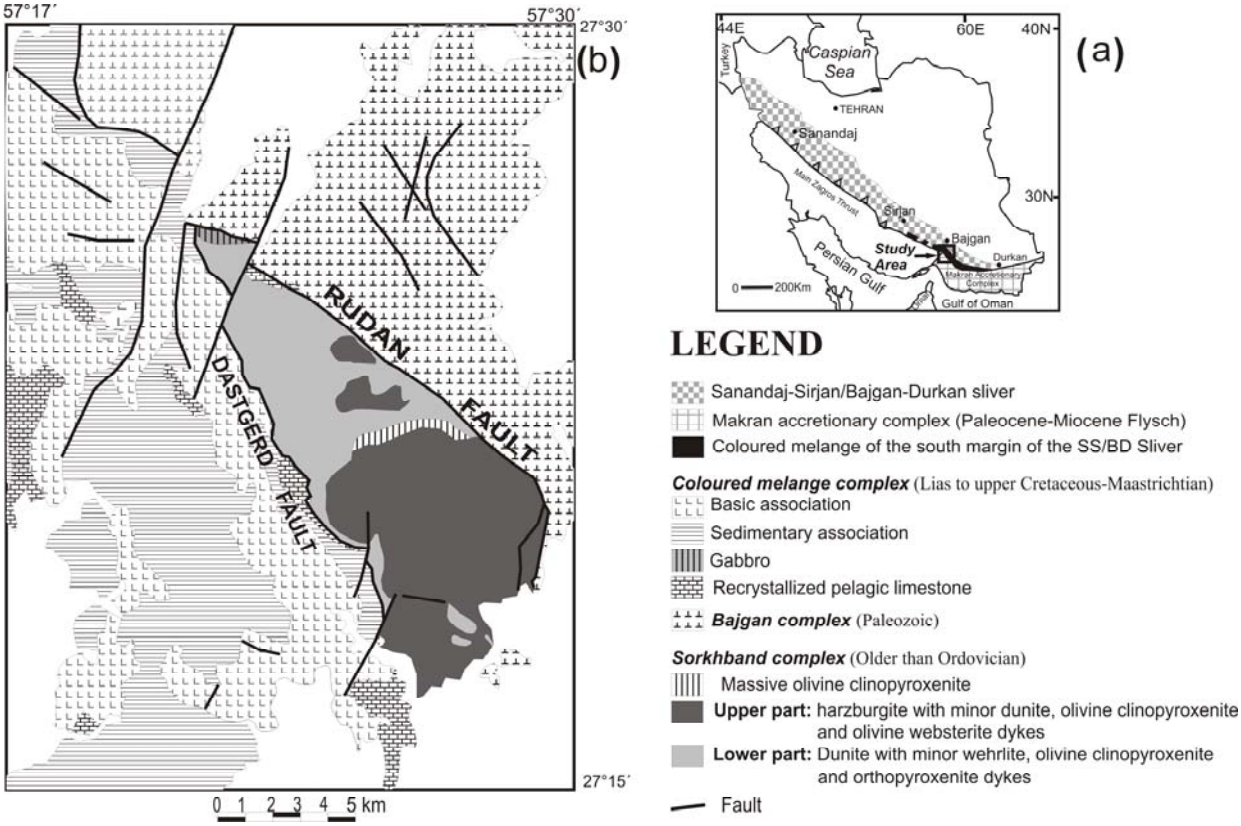
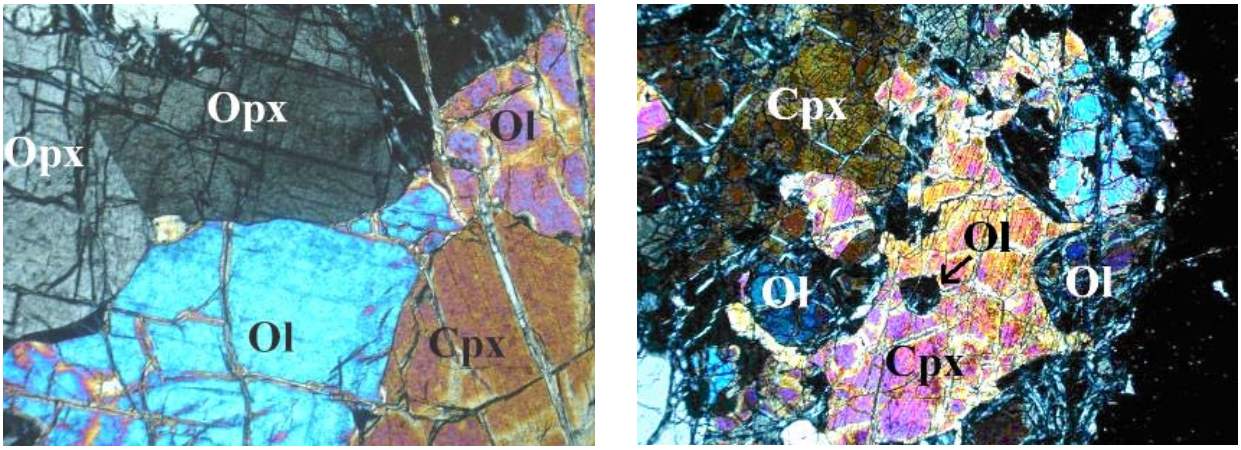


Fig. 1. (a) Location of the study area in Southern Iran. (b) Simplified geological map of the Sorkhband ultramafic complex (Modified after McCall, 1985a).



a b

Fig. 2. Petrography of wehrlites in the Sorkhband ultramafic complex. (a) Recrystallization as triple junction boundary between olivine (Ol), clinopyroxene (Cpx) and orthopyroxene (Opx) minerals in wehrlites (picture length=1.2 mm, XPL). (b) Allotriomorphic impregnated clinopyroxene (Cpx) with olivine inclusion which interstitially filled between olivine minerals (picture length=3 mm, XPL).

According to Nicolas and Prinzhofer (1983), wehrlite may be formed by the passage of a melt through dunite bodies where by the process of impregnation and melt-rock interaction clinopyroxene crystallize in dunite. Such impregnated clinopyroxenes are allotriomorphic and interstitially filled between olivine crystals

and due to poikilitic crystallization may contain spinel and olivine inclusions (Fig. 2, b). Other evidences of melt-rock interaction in the Sorkhband ultramafic complex have been reporetd before (Najafzadeh et al., 2009, 2010).

So, regarding the mineral chemistry; REE, PGE and transition elements (TE) patterns similarity in between wehrlites and olivine clinopyroxenites in the Sorkhband ultramafic complex it can be concluded that wehrlites are most likely formed by interaction of pyroxenite melt with dunites as a result of impregnation and melt-rock interaction.

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