Listvenites as targets for Au-Hg mineralization in Central Iran ophiolites

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Abstract

Central Iran ophiolites are widespread in two main Belt ;Dehshir-Naien& Anarak –Jandaq. Serpentinites which are the main parts of these ophiolites,have undergone hydrothermal alteration in parts,so listvenites (or quartz-carbonate rocks) are occured. Listvenite occurence is due from interaction of CO2 bearing fluids on serpentinites.Listvenites are characterized by following mineral assemblage:

Quartz,magnesite,dolomite,relicts of serpentine ,Cr-spinel,iron oxides the main texture of primary serpentinites always preserved as gohst texture.In the advanced process of hydrothermal alteration these rocks transformed to more silicified rocks called birbirites.There are some mineralized listvenites in Anarak ,Naien & Dehshir.Geochemical analysis have shown anomalies for Hg(up to 49ppm),Sb & As.SEM studiesdetermined visible gold in association with Iron oxides & Hg –minerals too, so in central Iran ophiolitescould account for a new target for Gold prospecting & exploration.

Keywords*: Listvenite;Ophiolites;Serpentinites;Gold;Central Iran; Carbonate; Hydrothermal alteration.*

Introduction

The studied area is located in central Iran geological unit.(fig.1) Naien Ophiolite terrain exposed as a narrow band trending N- S in North of Naien town(fig.2). The ophiolite exposed beside or along major Naien- Baft in Iran. Tertiary sedimentary rocks & magmatic rocks (Eocene-Oligocen) are outcropped extensively in east & west of this opiolitic band respectively.

Naien ophiolite is emplaced during upper cretaceous to paleocen, regarding to age of other rock unites in vicinity of ophiolite.

The main constituents of ophiolite are harzburgite, serpentinite, Pyroxemite, gabbro diorite, plagiogranite , massive & pillobasalts, also lehrzolite , dunite & wherlite are less abundant in the field .

Hydrothermal alterations

Hydrothermal alteration are widespread within serpentinites of Nain ophiolite, The most outstanding of those including: Carbonatization & Rodingitizaion.

Carbonatization is take place along main faulting & fracturing within serpentinites with other ophiolite unites(fig.3,4,5). Roadingitizaion occurred only in gabbro dykes or boudines in serpentinizesd harzburgites.

It is obvious that Co_2 rich fluids are resulted in listventies or Quartz- Carbonate rocks.

In field outcrops listvenites are present sas out standing peaks or small trends in serpentinites. Their color varies from pale-brown to brown which in some cases, they may be mistaken by

pelagic limestones from ophiolite mélange. Silicified patches or parts in listvenites are also outstanding & occurred in dark gary to very dark brown.
With high relief in listvenite host rock.
Iron oxides coloring, probably due to oxidation or decomposition of pyrite often accompanying the listvenite outcrops specially silicified parts. Sometimes there is aboundant veins of quartz- chalcedony & dolomite in listvenites.
In petrographic studies the following critical assemblages are distinguished(fig.6,7):
quartz+ Mg-Fe carbonates (Mangnesite , dolomite) Cr- Spinel ± Serpentines ± opaque minerals ± chlorite. Relics of Cr- spinel or chromite & Serpentine shows that the ultramafic nature of primary rock. In some cases ghost texture of host serpentinite (mesh texture) are well preserved in listvenite but the granoblastic texture is common silicified parts are characrerized by very fine grained texture of quartz likely as cherts or jasperoids.
Ore petrography revealed the exsistence of chromite , pyrite, hematite & goetite disseminations.

Hg- Au Mineralization

SEM studies also showed that the sulphide mineralization is only restrict to silicified Zones. Pyrite is mainly occurs as disseminations and less seen massive.
There is also some oxidized pyrite which well preserved the primary cubic form (pseoudomorph) Hg- Mineralization (fig.8,9) is associated with pyrites & oxidized pyrite (pseoudomorph) & also massive products of pyrite oxidation (Hematite & goetite). Hg ore minerals are found as anhedral shope, tiny dropes of Hg & Pore space filling.
Gold mineralization also is found as micron sized particles along fractures in silicified groundmass.(fig.10,11)

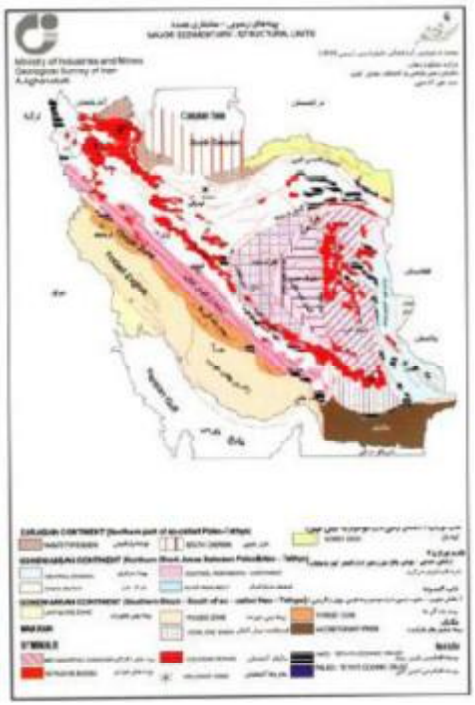

Fig.1-Geological divisions of Iran and position of Nain ophiolite.

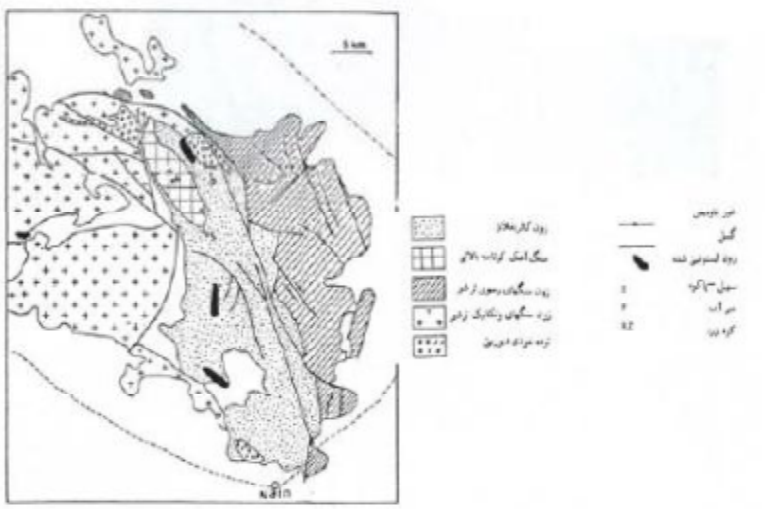

Fig.2-Geological map of North of Nain and position of listvenitized zones.

Fig.3-Field outcrope of listvenite the silicified parts are most outstanding

Fig.4-Tectonic contact of serpentinite ,whith listvenite.(transition zone).

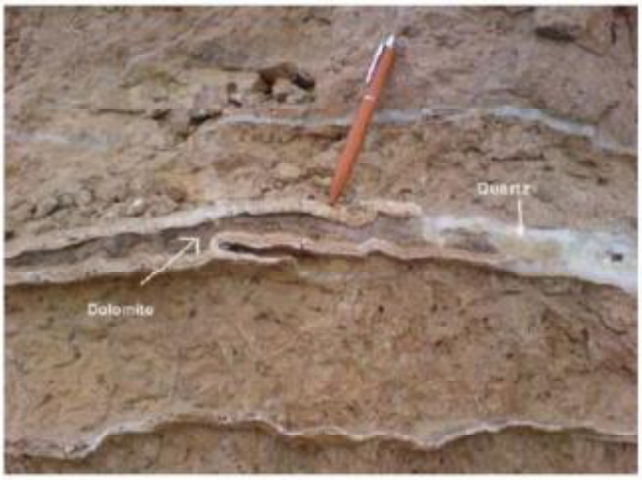

Fig.5-Veinlets of quartz ,chalcedony and dolomite.

Fig.6-Association of dolomite and finely crystallized quartz ,late quartz veinlets are common in listvenites .XPL×100.

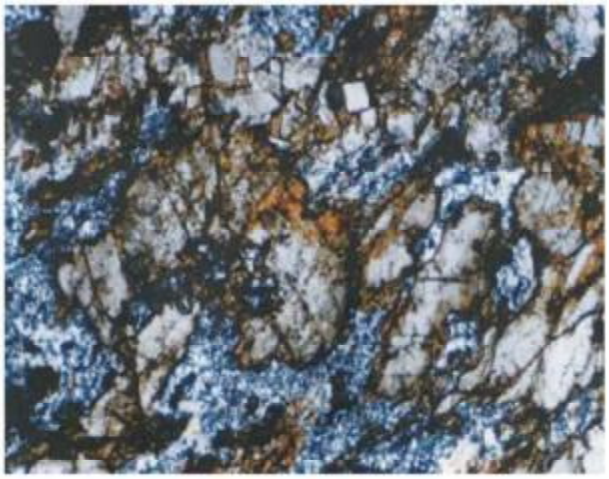

Fig.7-Late oxidized margine of Fe dolomite which is characterized by brown staining in margines of dolomites.XPL×100.

Fig.8-Hg mineralization in groundmass of silicified.

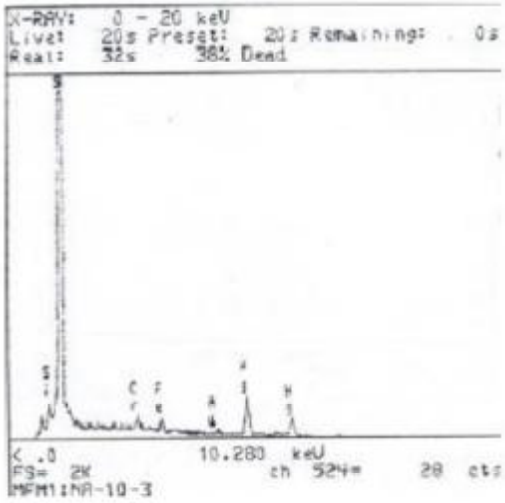

Fig.9-SEM analysis of Hg-compound.

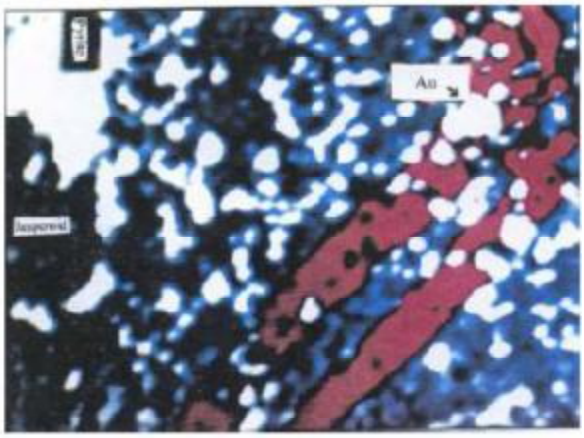

Fig.10-Micron size of gold grain which is emplaced in a Fracturing

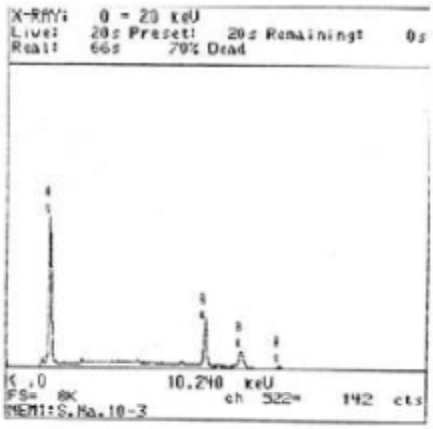

Fig.11-SEM analysis of gold grain.

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