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CO<sub>2</sub>  
Mg- Fe- Ca

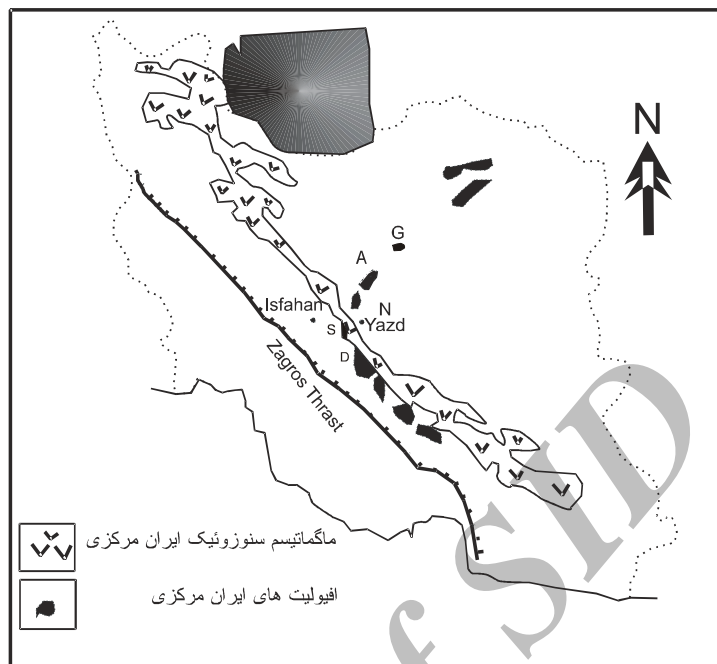
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G: A: N: S: D:

## Gold Mineralization in Central Iran Listvenites

M. Noghreian<sup>\*</sup>, M. A. Haghighipoor<sup>\*\*</sup>, M. A. Mackizadeh<sup>\*\*\*</sup>, B. Taghipour<sup>\*\*\*\*</sup> and S. Sherafat<sup>\*\*\*\*\*</sup>

<sup>\*</sup>Department of Geology, University of Isfahan

<sup>\*\*</sup>Department of Chemistry, University of Isfahan

<sup>\*\*\*</sup>Ph.D. Candidate, Shahid Beheshti University

<sup>\*\*\*\*</sup>Jahad Daneshgahi, of Isfahan University of Technology and Ph.D. Candidate, University of Isfahan

<sup>\*\*\*\*\*</sup>Ph.D. Candidate, University of Isfahan

### Abstract

Listvenites are formed during the CO<sub>2</sub>-rich fluids ultramafics interactions. Commonly, these carbonatized ultramafic rocks (especially serpentinites) are characterized by quartz and Mg-Fe-Ca carbonates assemblage. Gold mineralization in these rocks had been a new target for exploration during the past decades.

There are two main ophiolitic belts in Central Iran, Dehshir-Surk-Nain belt and Jandagh-Anarak belt. Hydrothermal alterations have produced listvenites and finally birbirites (silicified serpentinites) in ultramafic members of these ophiolites. In Dehshir, listvenites and paralistvenites are outcropped along the

ophiolite belt and are barren. In Surk, listvenitization is followed by birbirite formation and gold mineralization has a close association with ferrite chromites.

There is pyrite mineralization in highly silicified serpentinites with Au-Hg anomaly in Nain ophiolites. In Jandagh serpentinites, talc-carbonate rocks are formed during carbonatization. Trace amounts of gold anomaly are detected in these rocks. Anarak old ophiolites have widespread listvenitization. Various minerals and ore minerals with multistage paragenesis are characteristic. In addition to geochemical anomaly, gold mineralization is detected as visible gold.

**Key words:** Ophiolite, Serpentinite, Listvenite, Birbirite, Gold

Mg-Fe-Ca

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(Carbonatization)

(Ghost texture)

(Auclair et al, 1993)

(Sazanov,1975)

(birbirite)

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« PH<5 S, K, CO<sub>2</sub>

(Buisson et al,1985) Sazonov, )

.(1978

(Zod) (Halls et al, 1995)

(Spirinov,1991)

(Smirnov et al, 1983)

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( ppm )

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(XRD) X

(XRF) ( )

(NAA) ppm) ( , ppm) ( ,

As, Hg, Sb, Cu )

» SEM

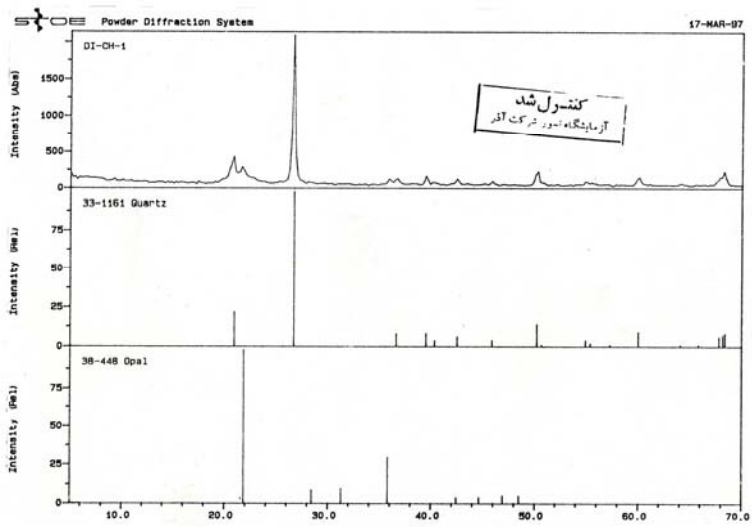
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XRD-SEM

NAA

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	Di-Ca	DE	Ar-3	WA-1
Ag ppm	1.1	2.7	1.9	5.0
As ppm	13.96	5.3	16	592.4
Au ppb	5.83	0.9	17	0.08
Cu ppm	135.2	120	300	257
Sb ppm	0.1	1.9	0.55	308

:Di-Ca

:DE

:Ar-3

:WA-1

	S-3
	S-5
	W-E-4
	W-E-1
	DE-1

CO<sub>2</sub>

SiO<sub>2</sub>

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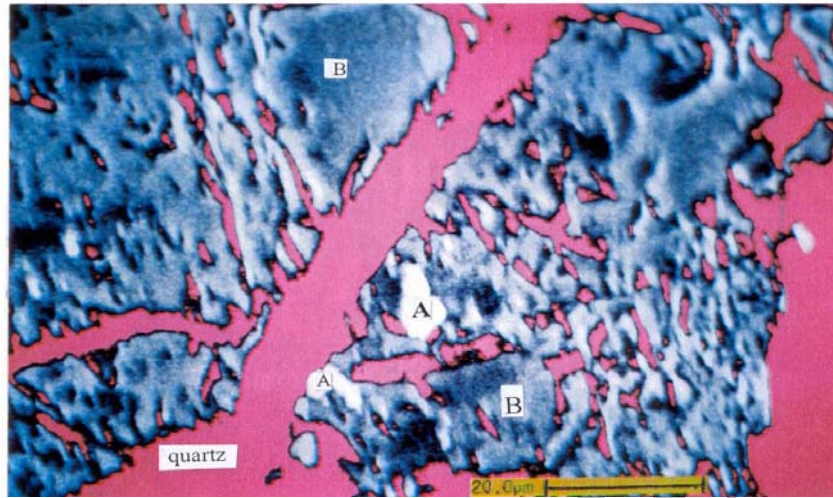
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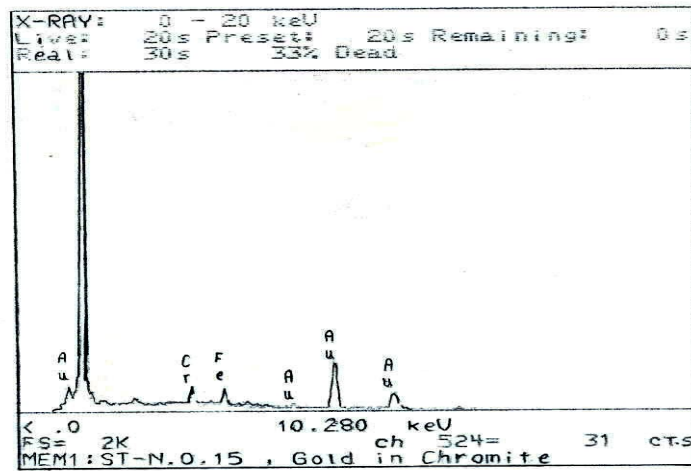
SEM

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( ) (A) (B) SEM



آنالیز نقطه‌ای دانه طلا کرومیت‌های سورک ، Ca, Fe, Cr از زمینه وارد شده است.

	ST	W-E-100	W-E-101
Ag <sub>ppm</sub>		0.6	4.2
As <sub>ppm</sub>	602.25	16.6	5.2
Au <sub>ppb</sub>	10.73	7.3	14.1
Cu <sub>ppm</sub>	1.18	103	19
Sb <sub>ppm</sub>		0.532	348

:ST

:W-E-100

:W-E-101



	Na-1	Na-2	Na-3	Na-4	Na-5
Hg ppm	0.1	2.87	26.9	49.66	n.d
Au ppm	1.8	n.d	0.014	0.47	0.03

Na-3

Na-1

Na-5

Na-4

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Na-2

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ppb

NAA

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« , PPM»

«SEM»

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CO<sub>2</sub>

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«d »

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	Au gr/t		Au gr/t
E <sub>4</sub> -811/7	0.8	E <sub>4</sub> -4871	0.1
E <sub>4</sub> -15 01	0.8	E <sub>4</sub> -4874/7	0.1
E <sub>4</sub> -1501/2	0.2	E <sub>4</sub> -4874/8	0.1
E <sub>4</sub> -1547/1	0.2	E <sub>4</sub> -4874/13	0.2
E <sub>4</sub> -1560/2	0.1	E <sub>4</sub> -4874/14	0.2
E <sub>4</sub> -1580/4	0.1	E <sub>4</sub> -4882	0.2
E <sub>4</sub> -4749/5	0.7	E <sub>4</sub> -4939/3	0.2
E <sub>4</sub> -4749/7	0.2	E <sub>4</sub> -4946	0.2
E <sub>4</sub> -4781/2	0.2	E <sub>4</sub> -4746/3	0.4
E <sub>4</sub> -4846/8	1.0	E <sub>4</sub> -4946/4	0.2
E <sub>4</sub> -4869	0.4		

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(1981, 1984)

Technoexport, 1981)

SEM

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Au

(Syntectonic)

Cu, Sb, As



- Science Publishers, Moscow, 171pp. (1975).
- 14- V.N., Sazonov, Chromium in the hydrothermal process (Khrom v gidrotermal-nom protse sse): Nauka Press. Moscow. (1978).
- 15- V.I(editor), Smirnov, A.I., Ginzburg, V.M., Grigoriev, and G.F., Yakovlev, Studies of mineral deposits, English translation, Mir Publishers Moscow, 286 pp. (1983).
- 16- E.M., Spiridonov, listvenites and zeolites, International Geology Review 33(4): 397-407.(1991).
- 10- C., Halls, R., Zhao, Listwaenite and related rocks: Perspectives on terminology and mineralogy with reference to an occurrence at Cregganbaun Co. Mayo, Republic of Ireland. Mineralium Deposite, Vol.30, pp303-313. (1995).
- 11-V/O Technoexport, Detailed Geological prospecting in Anarak area (Central Iran), Report No.13, Moscow, pp293. (1981).
- 12- V/O Technoexport, Qutine of Metallogeny of Anarak area (Central Iran), Moscow, pp136. (1984).
- 13- V.N., Sazonov, Listvenitization and mineralization

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