

## **Komatiite Basalts of Sefid Sang ( Fariman)**

Writers : Publishing Year : 1389

**Kalali Mahmood Abadi- Amirreza**

(universit of azad shahrood)

**Dr Fazel Valipoor- mohammad**

(university of azad mashhad)

**Dr jafarian-Abdolreza**

(university of azad shahrood)

---

### **Abstract**

*Sheet of Sefid sang is in N 60° - 60° 30' and E 35° 30' - 36° in the northeast of iran. village of sefid sang is near to fariman*

*Sefid sang has about 35 kilometers distance to fariman and about 100kilometers to mashhad. In road of Sefid sang to Shahan garmab village and senjedak village, we can see group of mafic and ultramafic rocks in sides of road, that Include : Wehrlite, Dunite Gabro, Microgabro and Basalat (Pillow Lava). With petrography and geochemistry of basalt rocks in this locality we can say : they are komatiite basalts with spinifex textuers.*

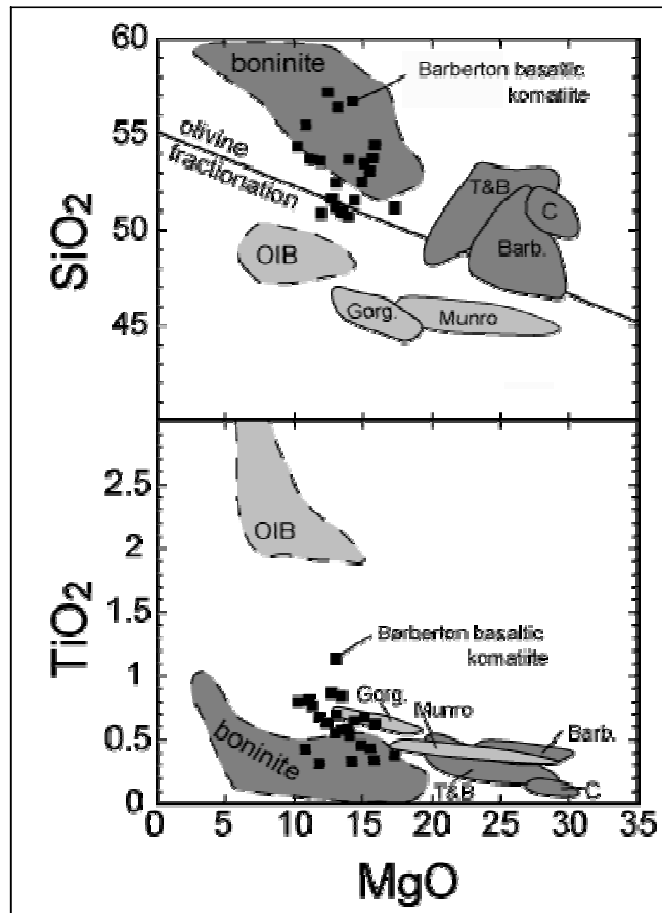
**Key words:** *Sefid sang - Komatiite basalts -Spinifex textuers.*

### **Introduction**

#### **Komatiites :**

Komatiites were first recognized in the late 1960s in the Barberton Mountainland greenstone belt in South Africa (*Viljoen & Viljoen, 1969a,b*). They have extremely high MgO contents; 18-30 wt.% compared to 10-15 wt.% for the most mafic mid-ocean ridge basalts (MORB) or ocean-island basalts (OIB, Figure 1). The MgO contents of magmas is proportional to their melting temperatures (higher MgO means hotter magmas) and the first experiments on komatiites (*Green, 1975*) were interpreted to imply melting conditions in excess of 1600°C.see also Temperature and Mantle temperature pages). Subsequent dating showed the Barberton komatiites to be 3.5 billion years old (*Lopez-Martinez et al., 1992*) and so the high temperatures inferred for the komatiite source region fit nicely with the concept of a hot early Earth.

Komatiites from the Superior province in Canada (the Munro komatiites) were the next to be well studied (*Arndt, 1976; Pyke et al., 1973*). These are younger (2.7 Ga) than the Barberton komatiites and have lower MgO contents (up to ~ 24 wt.%). This also fit well with the idea of a cooling Earth. At the time, there was still some debate about the tectonic setting of komatiites. A whole range of settings was considered, *e.g.*, mid-ocean ridge, plume, giant impact and magma oceans.



( Figure 1 )

Komatiites are higher in MgO than boninites, and one cannot make a direct comparison. However, there are similarities. High SiO<sub>2</sub> for given MgO, very low TiO<sub>2</sub> (Figure 1).

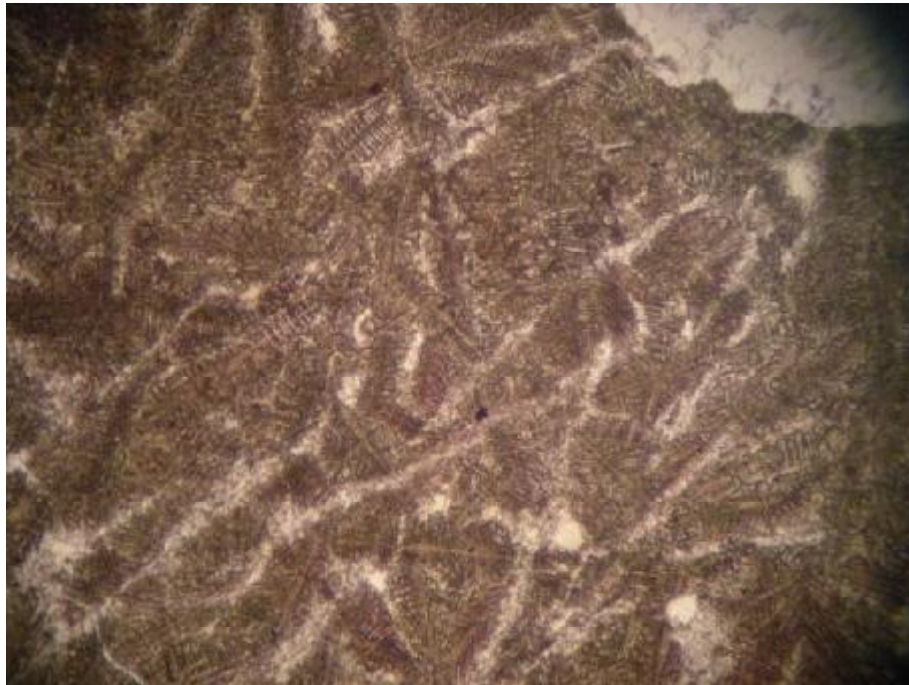
### Basalts of Sef id sang

There are mafic lava flows with pillow and brecciated features, and in a detail petrographic studies of them we have found varieties of disequilibrated textures including pyroxene spinifex textures in mafic samples, and as there are special geochemical criteria introduced for komatiitic rocks in the Northeast of Sefidsang, we have recognize them so . It may be that mafic rocks have been olivine fractionated products of ultramafic parent melts which have their out crops in the same area, as there is a close spatial and time relationship between them and regard to some petrographic evidences in the cited area ultramafic- mafic rock out crops are observed as lava flows sills, rarely as small dikes and they have contained an unique collection of disequilibrated textures.

Here we have described disequilibrium textures in mafic and ultramafic rocks of Sefid sang's samples and attributed their formation to an unusual high temperature of their ultramafic parent magma.



**figure2- spinifex texture (xpl)**



**spinifex texture(ppl)- figure 3**

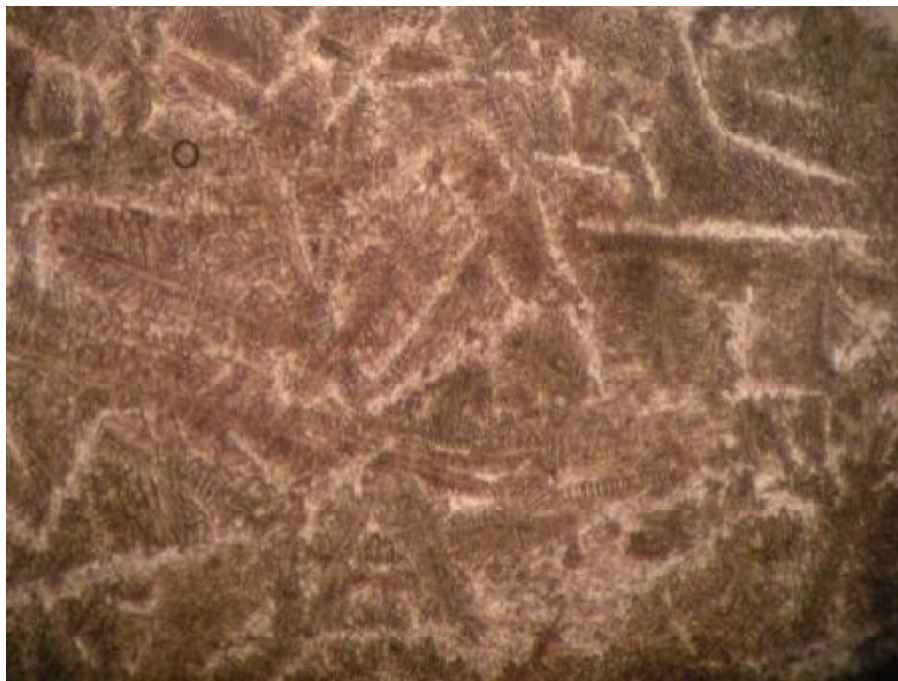


figure4- spinifex texture(ppl)

### **Economic importance**

basalts of sefid sang in some location has economic elements include :Au , Cu , Ni, Ag and co .The economic importance of komatiite was first widely recognized in the early 1960s with the discovery of massive nickel sulfide mineralisation at Kambalda , Western Australia. Komatiite-hosted nickel-copper sulfide mineralisation today accounts for about 14% of the world's nickel production, mostly from Australia, Canada and South Africa.

Komatiites are associated with the nickel and gold deposits in Australia, Canada , Iran , South Africa and most recently in the Guiana shield of South America.

### **Conclusion**

With petrography and geochemistry of mafic rocks(basalts) in this locality (Sefid sang) we can say : they are komatiite basalts with spinifex textures.

### **References**

- Hess, P. C. (1989), *Origins of Igneous Rocks*, President and Fellows of Harvard College (pp. 276-285), ISBN 0-674-64481-6.
- Hill R.E.T, Barnes S.J., Gole M.J., and Dowling S.E., 1990. *Physical volcanology of komatiites; A field guide to the komatiites of the Norseman-Wiluna Greenstone Belt, Eastern Goldfields Province, Yilgarn Block, Western Australia.*, Geological Society of Australia. ISBN 0-909869-55-3
- Blatt, Harvey and Robert Tracy (1996), *Petrology*, 2nd ed., Freeman (pp. 1967), ISBN 0-7167-2438-3.

- S. A. Svetov, A. I. Svetova, and H. Huhma, 1999, Geochemistry of the Komatiite “Tholeiite Rock Association in the Vedlozero” “Segozero Archean Greenstone Belt, Central Karelia, Geochemistry International, Vol. 39, Suppl. 1, 2001, pp. S24S38.
- Vernon R.H., 2004, A Practical Guide to Rock Microstructure, (pp. 43 – 69, 150-152) Cambridge University Press.
- Komatiites by N. T. Arndt (Author), E. G. Nisbet (Author) Publisher: Unwin Hyman (June 1982) ISBN 0045520194, Hardcover: 543 page
- Petrography, mineral chemistry of volcanic rocks from Torbatjam Fariman to Mashhad. Nimrouzi, Atefeh; Emami, Mohammad Hashem; Moafpourian, Gholam Ali .1386