



## **Prospects for the Discovery of the Fe-Ni Silicate Mineral Deposits in the Region Pollata, Municipality Podujeva- Kosovo**

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**Abstract:** Perspective geological research of nickel silicate ore in Kosovo are based on geological characteristics of mineral deposits and mineralization appearance of the Fe-Ni silicate. In the region Pollata in research have been included Murgulla and Ternavica locality where they applied geochemical method. Study localities belong to the Podujeva municipality, ophiolite Vardar zone and represent the most northeast part of the Kosovo territory. In locality Murgulla are determinate weathering crust based on analysis of formation. Geochemical study in Ternavici are realized by profiles along serpentinite and taken 600 samples in surface area of 1.5 hectares. Also are used and exploration drilling wells. Based to the spectrochemical analysis the percentage content of silicate nickel in Ternavica locality ranged from 0.19-0.98% Ni. These studies have given result on the existence the appearance of Nickel silicate ores. The paper aims to show results of geology perspectives researches for several decades, which will enable finding new mineral deposits of nickel silicate in state Republic of Kosovo.

**Keywords:** *Kosovo, nickel silicate, ore appearances, Pollata, weathering crust,*

### **Introduction**

Kosovo region is a part of central meridian metallogeny province (Albania, Turkey, Greece and ex Yugoslavia) related to initial of continental riftogenesis where powerful has been present development of facie carbonate type, mainly dolomite with a complex magmatic activity (Karamata *et al.*, 1980). The territory of Kosovo is characterized with a complicated geological structure that is reflected of different rocks, of different ages (Neo-Proterozoic to the Holocene), and many wrinkled structures and detaching with the following spreading directions: NNE-SSW, NNW-SSE and NW-SE (Pamić *et al.*, 2002).

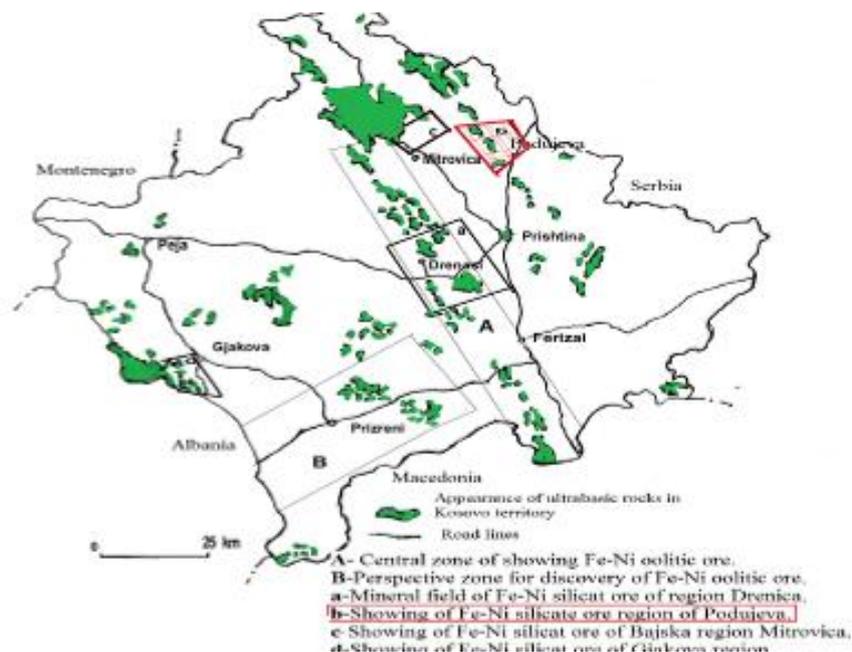
The products of the weathering crust of nickel silicate in Kosovo are related in genetics and spatial aspects with ultrabasic complexes. Ultrabasic rocks in the Kosovo region are Alpine type and are formed by partial or full of the melting of mantle Earth and presented as massive or islands (Karamata *et al.*, 1980) Figure 1. This ultrabasic complex is the result of oceanic crust development in two tectono-metallogeny zone, Vardar ophiolitic zone and Mirdita-Dukagjin ophiolitic zone (Doglioni *et al.*, 1998).

Ophiolites created by the closure of the Vardar Ocean are important because of ultrabasic complex associated chromites deposits (Boev, *et al.*, 1995). In these serpentines rocks in tropical and subtropical climate for dominant development intensive physics-chemical process of alteration is formed weathering crust important for products of bauxite and lateric nickel. Research locality Murgulla and Ternavica belong to Pollata region, Podujeva municipality and belongs to the Vardar ophiolite zone. This region represents the most northeast part of Kosovo territory Figure 1, (Dukagjin *et al.*, 1988; Matejevic, 1980).

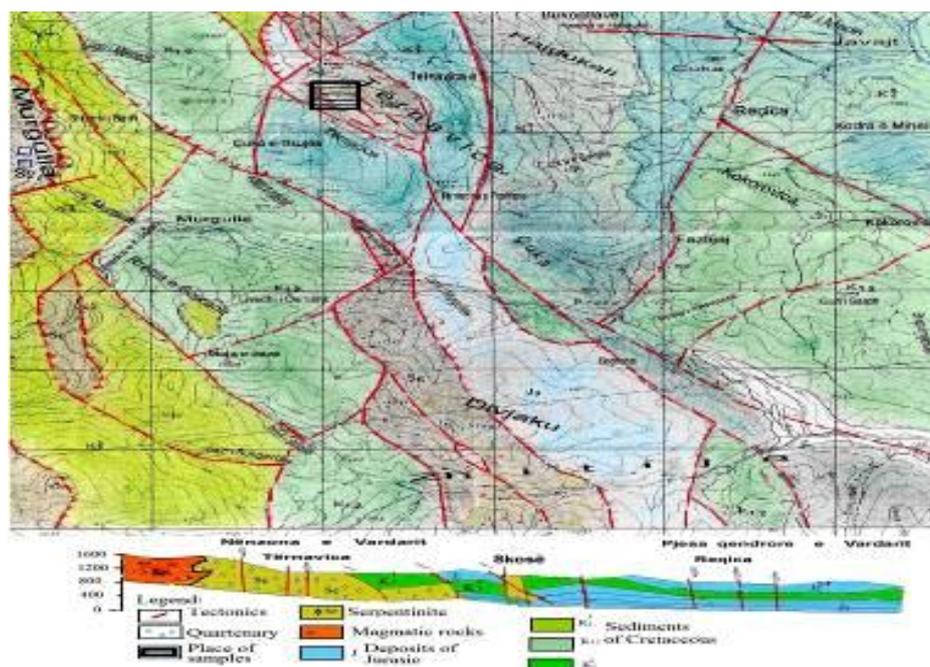
### **Appearances of Ni silicate ore in Pollata**

Geology and structural of research areas retains characteristics of the central Albanik (Kopaonik) zone. This terranes are building of Paleozoic series (schist), serpentinite, magmatic products of Tertiary, Cretaceous sediments, listvenite and basalts and Quaternary deposits, Figure 2. By aspect of geology building can be differ terrains which they are conditioned by tectonic events. The terrains built by Paleozoic series, diabase-chart series and vulcanite's of Tertiary. The rest of terrains built serpentised peridotites and serpentinite western part of researched and terrains built senonian flysch and Pliocene sediments presented from the river terraces, alluvial deposits, bigar and humus cover, Figure 2.

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**Figure 1.** Ultrabasic rocks appearance of Kosova territory. Koliqi A, 2003



**Figure 2.** Map and geological profile of Murgulla and Ternavica locations.

In this region have been represented tectonic structures N-S stretch and new areas with structures with extension in normal in general direction. Largest tectonic structures N-S is part of the regional structure which extends in the direction Artana (Novo Brdo) - Keçekolla- Kerpimej-river Murgulla-Ternavica - spa of Llukovo (Figure 2). All this tectonic structure is described he broke it intensive with direction E-W.

All this area is characteristic of hydrothermal intense changes, listvenyte, appearances and source ores of mercury, arsenic and the thermal waters of spa of Llukovo. In tapping these two tectonic structures with different directions are disposed very little appearances of sulfide mineralization ores of Pb-Zn-Cu, then lentils small basalts associated also with these fault zones.

In locality Murgulla and Ternavice serpentine are discovered in an area of several square kilometers. The serpentinites border of territory Ternavice is tectonic with Cretaceous sediments and Paleozoic schist's, Figure 2. In locality Murgulla, serpentinite are covers by Quaternary sediments that they have served for the saved weathering crust products (silicate Fe-Ni ore).

## Results and Discussion

### *Experimental results of analyses*

Survey nickel silicate ore of Murgulla and Ternavica localities have been orientated to the discovery of products on weathering crust of these localities. These studies were conducted including research complex geological and geochemical methods and drilling wells especially in Ternavice. In Murgulla locality of preliminary research are based on analysis of formation to determinate weathering crust. At the village cemetery in Ternavice defined part of the weathering crust which the percentage of nickel is brings from 2.3-3.6 % Ni. In order to recognition the exact nickel ore in Ternavice are applied geochemical prospecting with profiles that have been orientated normal to the extent of serpentinite. The number of samples taken for analysis has been 600 in surafce area of 1.5 hectares, and all are study are analyzed with spectrochemical methods in laboratory of "Ferronickel" Company in Drenas. Results and maximum sensitivity to specific elements expressed is presented in Table 1.

**Table.1.**The spectrochemical content analysis in the locality Ternavica .

| Elements                       | %           | Microelements | ppm  |
|--------------------------------|-------------|---------------|------|
| SiO <sub>2</sub>               | 37.77-42.39 | Pb            | 100  |
| TiO <sub>2</sub>               | 0.24- 0.35  | Zn            | 100  |
| Al <sub>2</sub> O <sub>3</sub> | 6.9- 10.46  | Cu            | 100  |
| Cr <sub>2</sub> O <sub>3</sub> | 0.60-0.77   | Ag            | 100  |
| Fe <sub>2</sub> O <sub>3</sub> | 15.8-22.94  | As            | 100  |
| FeO                            | 0.24-0.30   | Co            | 100  |
| MnO                            | 0.16-1.11   | C             | 100  |
| NiO                            | 0.19-0.98   | Sb            | 100  |
|                                |             | Sn            | 100  |
| MgO                            | 1.45-7.73   | Mo            | 1.2  |
| CaO                            | 0.55-1.15   | Ti            | 12.2 |
| H <sub>3</sub> O <sup>+</sup>  | 2.98-7.40   | Li            | 10.8 |
| OH                             | 2.25-4.31   | Zr            | 8.7  |

Based on to the research done by drilling wells explored in this locality is not met the fully weathering crust. Almost all drilling ended in crystalline schists that have increased nickel content. We can conclude that the weathering crust is stored of several lentils form nearby village cemeteries in Ternavice (Koliqi , 2003).

## Conclusion

Studies in the Pollata region, Murgulla and Ternavice localities, are realized the regional researchs, they have defined very important premise for the discovery of new mineral deposits of nickel silicate. These are part of the perspective research to detection of structural-metallogenic units of Fe-Ni silicat ore in the territory of Kosovo involving several decades of geological research. By applying the formations analyze are the specified ultrabasic territories when is development the weathering crust nickel silicate products. Studies in Murgulla , specifically in Ternavica with spectrochemical analyze has determinate silicate ore with content which ranges from 0.19-0.98 % Ni. Based in results of drilling well and attribute migration of nickel seems that contact between serpentinite and schist are interesting for the nickel mineralization. Also the presence of listvenite is premise for detection of Cu-Ni mineralization with hydrothermal genesis. These premises will be used for geological details research to disclose the new nickel deposits in the territory of Kosovo with national interest.

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