INTRODUCTION

The platinum group metals (PGE) are a group of elements that are chemically similar to the noble metals. They are found in the crust of the Earth and are commonly associated with certain types of magmatic and hydrothermal processes. PGE occur in four distinct types of major deposits: (1) magmatic segregation deposits, (2) crustal sulfide deposits, (3) mantle melts, and (4) hydrothermal deposits.

SAMPLES

Unique Tıshalıhisar PGE-Cu-Ni sulfide deposit is located in the northwest flank of the Tıskavásh trap formation of Silivri. All metals entered the kerogens owing to a remobilization (reworking) of one elements. The discovery of the Tıshalıhisar deposits with high-grade sulfide ore confirmed to the base of Early Tıskavásh type [300 m in average] U-shaped bodies of the giant Siberian traps significantly influ-
enced concepts of the origin of magmatic-copper-nickel ores. Intensive attraction from the world’s leading scientists to the Tıshalıhisar and temporarily and associated nickel deposit is due to uniquely given state of ores, their associated with the young Mesozoic Basalt Traps, and the fact that at other large known deposits copper-nickel and platinum are deposits in the world are much more older and associated with great Precambrian ultramafic intrusions. The discovery of a new type of one deposit not only opens the situation in the world’s mineral mar-
kets, but also strongly improved the understanding of magmatic sulfide ore formation. If the hy-
drophis of a genetic links between formation and the trap is correct, similar deposits may be dis-covered in all continents affected by the global Mesozoic trap-magmatism and all other places, where huge trap-magmatism occurred during its evolution history.

RESULTS AND DISCUSSION

LIBS RESULTS VALIDATION

In order to examine the capability of LIBS for high-resolution chemical mapping, the area of 25x25 mm was scanned with the spatial resolution of 100 μm. In the first map, the resulting chemical maps were compared with the pictures obtained via TIMA. Special attention was paid to the spatial deposition of individual minerals and corresponding elements within the sample. After revising and comparing the chemical composition of the TIMA pictures, it was clearly visible that the elements corresponding to individual minerals have the same spatial deposition within the sample Fig. 1. The resolution of TIMA pictures was similar to the conditions of LIBS pictures for easier compar-
ison. In the Fig. 3 there is an illustration for chemical map of lead and TIMA picture. The mineral deposition and the chemical formula of TIMA correspond with the LIBS data.

EXPERIMENTAL METHODS

LIBS PLASMA INDUCED CHEMICAL ANALYSIS

LIBS plasma induced chemical analysis is Laser-Induced Breakdown Spectroscopy (LIBS). LIBS is a simple atomic emission spectrometry technique capable of real-
time, essentially non-destructive determination of the elemental composition of samples of any state of matter, liquid, solid, or gas with a great potential for chemical mapping [2]. Recently, LIBS has been well developed when selected for alien exploration [3]. In order to obtain volume information about the samples, the µCT statistic has been employed, which in combination with LIBS data allows 3-dimensional spatial distribution and amounts of selected metals in the sample volume.

LIBS has already been developed as mobile devices demonstrat-
ing its potential to particular minerals have the same spatial distribution in LIBS chemical maps as in TIMA pictures. It was established that particular elements, corresponding to different minerals are present in the same spatial distribution in LIBS chemical maps as in TIMA pictures. Therefore, the LIBS data may be used for the investigation of various samples. Using scanning electron microscope together with various detection/identification elements of the mineral species in detail and in the same time to a possible to broad the knowledge of ores and ore deposits in general. Additionally, LIBS allow high speed automatic data acquiring and processing at the same time, thereby offers various types of analysis depending on required results.

LIBS INDUCED BREAKDOWN SPECTROSCOPY (LIBS)

The beam of ablation laser was directed normal to the sample surface by mirrors and focused onto the sample surface by a 30 mm focal length glass lens. The energy of the laser was 25 mJ per pulse (532 nm) and the repetition rate was 10 Hz. The sample was mounted on the stage with precision movements (1 µm resolution) inside the ablation chamber (Tescan a.s., CZ). The ablation spot was targeted and controlled by a CCD camera known outside of the ablation chamber. The LIBS plasma emission was collected with UV-NIR achromatic collimating mirror system, the charging detector ICCD camera (iStar 734i, ANDOR, UK) Fig. 1 was employed. The LIBS plasma radiation was collected with UV-NIR achromatic collimating mirror system, the charging detector ICCD camera (iStar 734i, ANDOR, UK) Fig. 1 was employed.