THE BEHAVIOR OF Fe, Ni, AND Pt IN SILICATE MELTS DURING IMPACT-SIMULATED HIGH-TEMPERATURE HEATING. M. V. Gerasimov[1], Yu. P. Dikov[2], O. I. Yakovlev[3], F. Wlotzka[4], J. Huth[4]. [1]Space Research Institute, RAS, Profsoyuznaya st., 84/32, Moscow 117997, mgerasim@mx.iki.rssi.ru, [2]Institute of Ore Deposits, Petrography, Mineralogy and Geochemistry, RAS, Staromonetny per., 35, Moscow 109017, dikov@igem.ru, [3]Vernadsky Institute of Geochemistry and Analytical Chemistry, RAS, Kosygin st., 19, Moscow 117975, yakovlev@geokhi.ru, [4]Max-Plank-Institut für Chemie, Abteilung Kosmochemie, Mainz, Germany.

Introduction: Modification of silicates under hypervelocity impact processing is one of fundamental factors during the evolution of solid materials from interplanetary dust to planets. Particular interest in such processing is the behavior of siderophile elements (SE) since their pattern in impactites is informative about colliding materials. Particularly, any enrichment of SE in impactites in terrestrial craters compared to SE concentration in target rocks is usually considered as a result of contamination by meteoritic projectile material. This approach is supported by the fact that many SE (particularly highly siderophile elements) are refractory elements and the resulting change in their concentration is expected only due to simple mixing of colliding materials. Nevertheless, there are mechanisms which provide sufficiently high mobility of highly refractory elements during an impact. One of the aims of present experiments was to investigate the behavior of Fe, Ni, and Pt at impact-related high-temperature conditions.

Experimental technique and results: Our experiments were performed using a laser pulse (LP) technique [1]. Composition of the vapor cloud was investigated by analysis of the composition and structure of the forming condensed film. Residual melt was collected both as melt sheet on the crater walls and as dispersed melt spherules. Chemical analysis of melt was performed using FESEM/EDS microprobe analysis. Chemical analysis of condensate was performed using X-ray photo-electron spectroscopy (XPS) technique. We used olivine and augite as target samples for investigation of behavior of Fe. Behavior of Ni was investigated using garnierite and kerolite. Behavior of Pt was investigated using a pellet of pressed powder of Murchison+Ti-basalt which was doped by Pt.

In all cases Fe, Ni, and Pt were efficiently removed from silicate melts and transported to the condensate. Observed enhanced “volatility” is the result of thermal reduction of these elements and formation of metallic nanoparticles with subsequent their dispersion into the vapor cloud. Such “mechanical” volatility also provides transportation of other SE partitioned into metallic phase during its formation in the melt.

Implications for natural processes: Reduction of iron with formation of nanoscale particles is a regular process for impact-induced high-temperature processing of silicates. This mechanism can be valuable for the consideration of formation of agglutinitic glasses on the Moon and formation of GEMS in IDRs. The formation and efficient loss of metallic iron particles is a possible mechanism which provides scavenging of SE from impact-induced silicate melts.

Acknowledgment. This research was supported by the RFBR grant 01-05-64564.

References: [1] Gerasimov M.V. et al. (1999) Physics and Chemistry of Impacts. In: *Laboratory Astrophysics and Space Research*, P. Ehrenfreund et al. (eds.), KAP, 279-329.