EXAMINATION OF THE RE-MELTED ZONE OF CHELYABINSK LL5 BLACKENED FRAGMENT USING MÖSSBAUER SPECTROSCOPY WITH A HIGH VELOCITY RESOLUTION: PRELIMINARY RESULTS.

A. A. Maksimova, E. V. Petrova, M. I. Oshtrakh. Institute of Physics and Technology, Ural Federal University, Ekaterinburg, 620002, Russian Federation. E-mail: alia55@bk.ru, oshtrakh@gmail.com.

Introduction: Recently fallen Chelyabinsk LL5 ordinary chondrite disintegrated in the atmosphere with numerous fragments formation. Their analysis demonstrated that these fragments have different lithology: light, mixed light and dark lithology and black lithology [1–3]. Blackened fragments were considered as a result of re-melting in the space probably due to collision. Comparison of iron-bearing phases in different fragments of Chelyabinsk LL5 meteorite is of interest. Therefore, Mössbauer spectroscopy can be used for modal analysis of these phases and for comparison of variations in local microenvironment of the ^{57}Fe in these phases using Mössbauer hyperfine parameters.

Experimental: Blackened fragment of Chelyabinsk LL5 meteorite was chosen for examination. This fragment was analyzed using optical and scanning electron microscopy. Then powdered sample was prepared for room temperature Mössbauer spectroscopy with a high velocity resolution.

Results and Discussion: Optical and scanning electron microscopy analyses demonstrated that blackened meteorite matter contained zones with different color: black and gray zones. Gray zones can be considered as completely re-melted meteorite substance. The powdered sample for Mössbauer spectroscopy was prepared from the gray zone. Mössbauer spectrum of this sample showed some visual differences from the Mössbauer spectrum of another fragment with a light lithology. The results of preliminary analysis indicated that there are differences for spectral components related to the M1 and M2 sites in olivine and M2 sites in pyroxene. The values of quadrupole splitting of these components for sample of the gray zone (completely re-melted) were different beyond the error from those for sample with a light lithology. Small decrease in the hyperfine field for the spectral component related to troilite in the gray zone may be related to increase in the iron deficiency in $Fe_{1-x}S$ (x is non-stoichiometry parameter) after troilite re-melting. Larger content of chromite was also observed in the gray zone on the basis of Mössbauer spectroscopy.

Acknowledgement: This work was supported in part by the Ministry of Education and Science of Russian Federation and the Russian Foundation for Basic Research (grant No 15-35-21164). A.A.M. is supported in part by the Ural Federal University development program for financial support of young scientists.

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