MID-INFRARED MICROSPECTROSCOPY ON SHOCK-WAVE LOADED CHELYABINSK LL5 OLIVINE

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The space weathering dramatically changes reflectance spectra of atmosphereless bodies. The Chelyabinsk meteorite matter is quite convenient for modeling experiments because of very poor contamination and oxidation thanks to fast recovery and complex history [1]. So, shock-wave loading experiments were produced [2]. Microstructure was studied [3] and different kind of structures were distinguished [4]. Previous spectroscopic studies of the Chelyabinsk have focused on the different wavelength ranges commonly used for asteroid remote sensing [5]. The LL5 lithology and bulk meteorite material shows typical Vis/NIR spectral features [6]. Some of microspectroscopic investigations for comparison between different minerals and lithologies of the Chelyabinsk and the Seymchan meteorites were made earlier [7].

Our experiments were made on bulk samples obtained from the Chelyabinsk meteorite fragments with light lithology by the same technology [7]. Samples were shock-wave loaded, cut and polished [2]. For each measurement we selected an area mainly occupied by olivine grains, using mid-infrared microscope, and obtained some spectra for averaging. This approach gave possibility to maximize olivine peaks contribution and accuracy.

Our previous results provided data from initial state (blue line on Fig. 1) Substantial shift of the olivine 986 and 946 peaks positions seems to be corresponds to all olivine of the meteorite [7]. It is clearly visible that position of 886 peak shifts towards red part of spectrum (black and red lines on Fig. 1) as for visible spectral range [1].

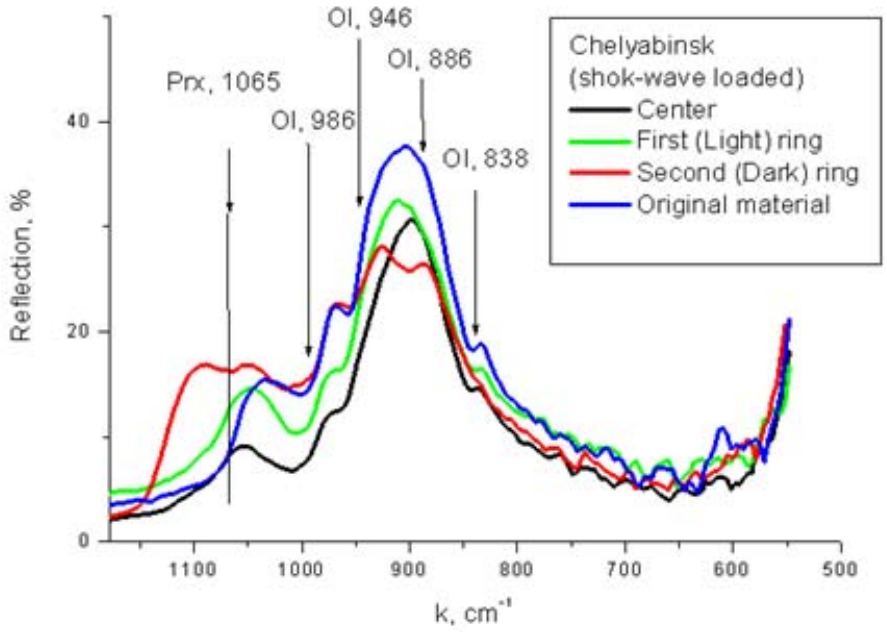

Fig.1. Mid-infrared spectra of different structures of the Chelyabinsk meteorite after shock-wave loading.

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