**USE OF FTIR-SPECTRA OF $CO_2$ TO THE ANALYSIS OF MARTIAN DUST SPECTRA.** Larissa P. Maxe, Regional Center for collective use of scientific equipment and instruments (CKP), Mogilev state university named after Kuleshov A. A., Mogilev 212022, Cosmonaut-str.1, Republic of Belarus, ckp@msu.mogilev.by, larmax_hb@yahoo.com

**Introduction:** With the use of the instrument InfraLum FT-02 (Lumex, Sankt-Petersburgh, Russia) FTIR-spectra of natural minerals, artificial materials, also spectra of the calcinated end products were registered. Spectra were analyzed to find similarities between separate components of their composition and components of Martian soil and dust [1,2,3]. Using a specific regime it was possible to receive spectra of a modulated short time $CO_2$ state.

**Experimental setup:** During previous work a new method was used that allows register the spectra of different powdered mineral substances, materials and gas components, water and solution, suspensions. Special experiments were carried to observe a specific state of gaseous $CO_2$ that presents in the room air and inside of the device. The stipulated short time state of $CO_2$ is specific and shows co-orientation action with water molecules.

**Results and Discussion:** Description of FTIR-spectra in the Figure 1 from top to down:

1 – The spectrum of a specially modulated and registered state of gaseous $CO_2$ was received as a difference between normal and newly created short time state. The spectrum shows relative decreasing of quantity of $CO_2$ in normal state – 668 $cm^{-1}$ and also an appearance of two new absorption peaks of water vapor – 1470 and 1405$cm^{-1}$ about.

2 – The spectrum of modulated state of $CO_2$ is received during the registration of $SiO_2$ spectrum.

6 – It is the three-component spectrum that shows the strips of the water vapor 1700 – 1500 $cm^{-1}$, $SO_2$ near 1370 $cm^{-1}$ and $CO_2$ presence – 670 $cm^{-1}$.

9 – The spectrum of the slag of the blast-furnace includes complicate silicate- and aluminum compounds – 900 – 700 $cm^{-1}$.

3 – Calcinated (at 1100 C°) powder of tripoli deposit (Mogilev region) in the spectrum gives two specific areas of absorption 1100 – 900 $cm^{-1}$ that indicate a process of the calcium silicate synthesis.

7 – This spectrum attracts the high temperature synthesis of the ferry-silicate compounds from clay and iron powders.

4 – The spectrum of the natural mineral Egirine includes silicates of iron and titanium that have the characteristic peak at 900 $cm^{-1}$.

5 – The spectrum of the silicagel is shown for a comparison with the spectrum of free liquid water. It has similar band of the absorption on 1650 $cm^{-1}$, but a disguised band between 900 – 500 $cm^{-1}$.

8 – The free liquid water has the spectrum that differs from its spectrum in vapor.

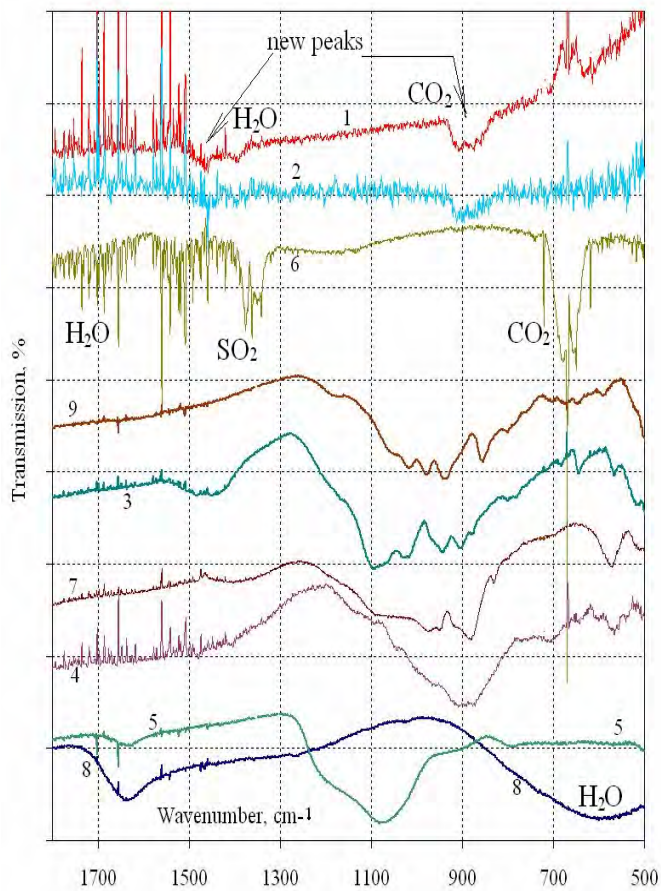


**Figure 1:** FTIR-spectra registered with the help of the instrument InfraLum FT-02.

The received during experiments FTIR-spectra show that the most probable products of the chemical weathering on the surface on Mars are not only various silicates but also aluminates of metals. Therefore the absorption near 870 – 830 $cm^{-1}$ is observed often. At that time it can be supposed that in Martian atmosphere the particles of dust and ice-dust are surrounded with adsorbed $CO_2$ molecules and this encirclement influence on the absorption and emission spectra of the Martian dust and dusted surface.

**Further work:** Work will be continued with use of cooling systems and special dynamic regimes.

**References:** [1] Bell, J. F. III (1999), *Int'l Mars Conf.*, #6017. [2] JGR, Vol. 106, No. 7, p. 14,733–14,746, July 25, 2001. [3] JGR, Vol. 110, E05012, doi:10.1029/2004JE002355, 2005
etc.