**IDENTIFICATION OF IRON SULFATES BY RAMAN SPECTROSCOPY. OUTCOMES ON THE MISSIONS TO MARS.** A. Sansano[1] , J. Medina[1] and F. Rull[1], [1]Unidad Asociada UVA-CSIC a traves del Centro de Astrobiologia (SPAIN) (sansanoca@cab.inta-csic.es).

**Introduction:** The iron sulfates are a very interesting target from the first moment in the exploration of Mars' surface. Their abundance, degree of hydratation and relationship with other geological processes as evaporitics or hydrothermal.

It is almost a demonstrated fact that in several geological ages in Mars, would be wide extensions covered by liquid water with different concentrations of the sulfates, of iron, calcium and magnesium, and also is very probably that these solutions were with a marked acidic character.

In the Earth, there are multiple analog could resemble in such a way to that environments, either for their geological story, either for their current features.

The Raman spectroscopy is a very powerful analysis tool, giving us physical-chemical information about the composition of the materials analyzed as its crystalline structure, reporting an idea of the processes where those materials were involved. Used with other spectroscopic technics we get a lot of data of this environment where they formed.

Also, the present of the sulfates and hydrated particularly are relevant as astrobiological aspect as biomarker[1].

In this work, we present some results of its application on synthetic materials and Mars' analogs and the possible extrapolation to Mars surface materials.

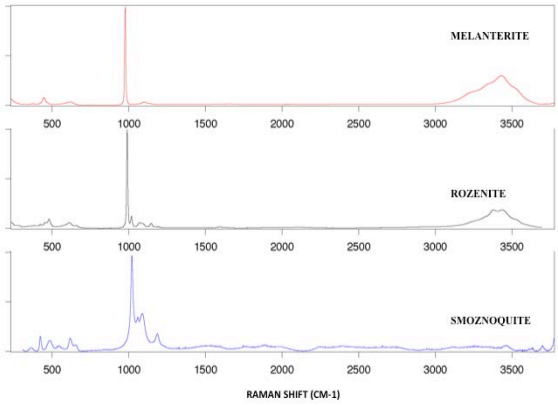
**Experimental:** Several iron sulfates were synthetized with the purpose of a)to get pure standards for the databases and b)to analyze, under controlled conditions, the parameter that conduct the formation of one or other sulfate.

The synthetized sulfates were rozenite, smoznokite, melanterite, and also, copiapites and jarosites. The sulfates were synthetized under laboratory-conditions. In some cases specific atmospheres were used with controlled humidity to set the hydratation degree of them.

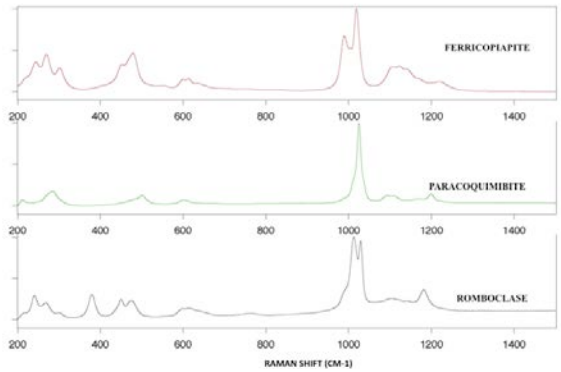
After that, the samples were analyzed by Raman. The importance of using this technique is also relative on the fact that there is a Raman Spectrometer in the Exomars' payload for the first time in the space exploration. Furthermore Raman, we use XRD and IR to verify the composition of the synthetized materials.

Afterwards, we compare them with samples from several analogs, in particular, evaporitic samples from Rio Tinto (Spain) and hydrothermal ones from El Jaroso (Spain).

**Results:** Some spectra collected are showed behind. In this case, several ferrous sulfates with different degrees of hydratation:




As we can observe, there's a shift in the principal bands of the sulfate to higher frecuences. Also we can observe several features in other sulfates' bands:




If we compare these materials with the results obtained with the analogs, for example Rio Tinto. We can observe the differences on the intensity of the bands relative to de degree of hydratation.

If we the synthetic jarosites with the natural samples, the differences appear on the crystalinite degree as we caould observe on the principal bands of the sulfate.

**Conclusions:**

By Raman Sectroscopy, there's a lot of information we could get from the iron sulfates, allowing to set some hypothesis about the orgin of those sulfates.

The results would possible to obtain with this technique on Exomars' mission could give us new data about the sequence of formation of the sulfate system on the brines of Mars and their possible implication in the habitability of that environment.

**References:**

[1] J.Parnell et al. (2012) International Journal of Astrobiology, FVA. 1-9.