

# Detection Of Hydrocarbons In Mighei Carbonaceous Chondrite By The Spectral Imager (SPIM)

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## Introduction

Carbonaceous chondrites contain a wide range of organic compounds, including aminoacids and nucleobases [1]. Delivery of these compounds to the early Earth through meteoritic bombardment may have contributed to the origin of life. We report the preliminary results of micro-scale reflectance spectroscopy investigations on Mighei carbonaceous chondrite. Mighei is a typical CM2 chondrite. It consists largely of a black matrix, olivine-rich chondrules, olivine aggregates and individual grains, carbonates, sulfides. The matrix is composed mostly of Fe-rich serpentine-tochilinite intergrowth intimately mixed with carbonaceous material [2]. Furthermore Mighei contains up to 2.5 wt.% organic material [3].

## Experimental Methods

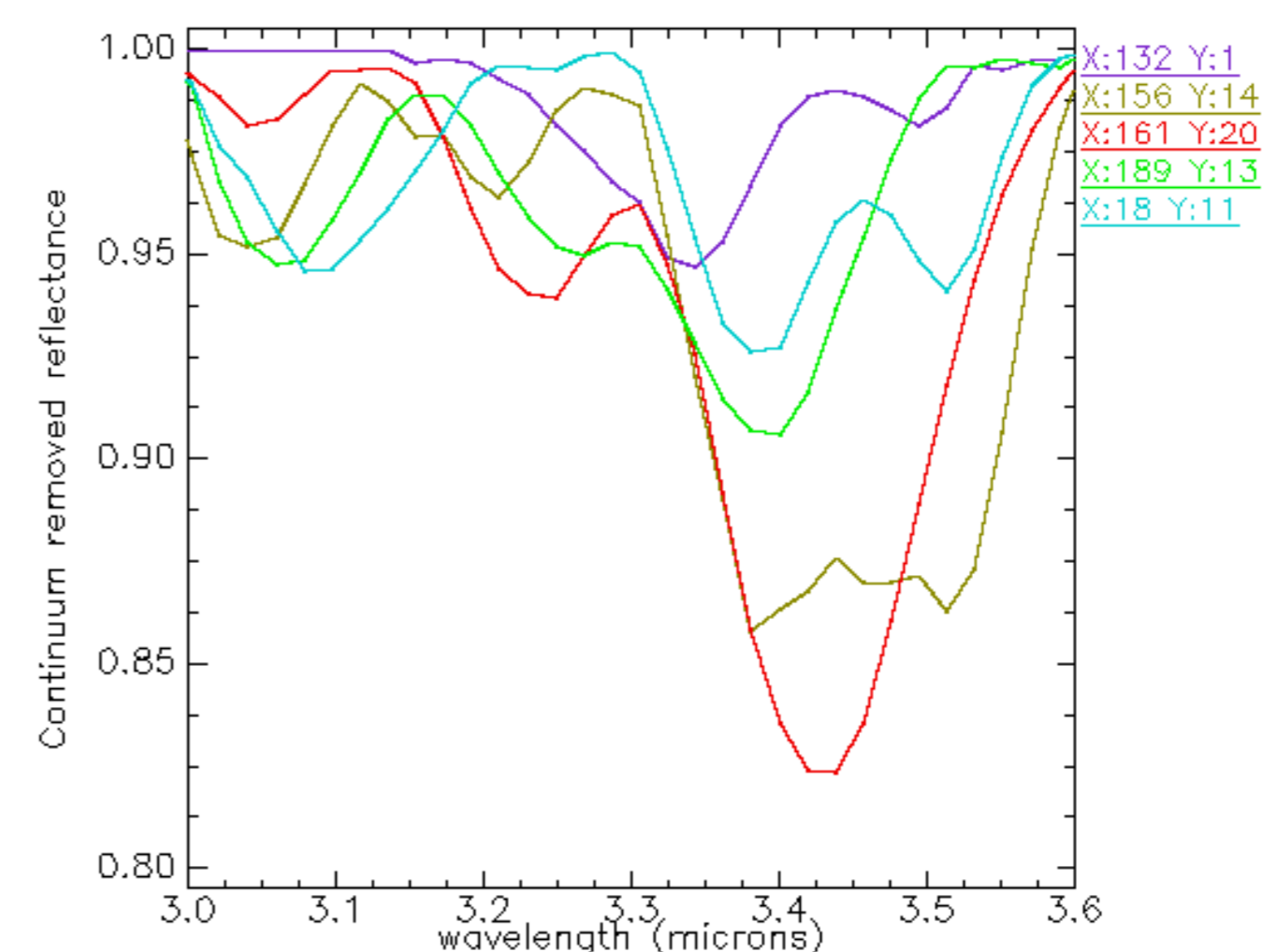
Data were collected by means of Spectral Imager SPIM facility [4] on unsorted powders of Mighei down to 200 $\mu$ m in size. The Spectral Imager SPIM is a replica of the Visible InfraRed imaging spectrometer (VIR)[5], onboard the DAWN spacecraft. The spectrometer covers the 0.25-5.05 $\mu$ m spectral range, with 38 $\mu$ m of spatial resolution on the target.

## Results

Seen through SPIM Mighei powders (fig.1) show several absorption features that are related to different minerals that goes from different types of phyllosilicates, to oxides and silicates. Moreover in most of the pixel spectra (red dots in fig.2) different band absorptions were found in the range between 3.1-3.6 $\mu$ m. Absorption features in this range are related to C-H compounds and C-O compounds. In particular, these Mighei grains show broad 3 $\mu$ m band due to O-H, a weak 3.27 $\mu$ m band that could be due to aromatic C-H, an intense band from 3.38 $\mu$ m to 3.41  $\mu$ m due to aliphatic C-H stretching.



**Fig.1 SPIM image of Mighei powders**



**Fig.2 Continuum removed pixel spectra of C-O and C-H related absorptions in the range between 3.0 and 3.6  $\mu$ m**



**Fig.3 Mapping of 3.4  $\mu$ m absorption that could be related to C-H aliphatic stretching**

## Preliminary conclusions

The spectral features founds in Mighei are in good agreement with those detected in organic matter found in previous spectral investigations of Mighei itself [6] and Murchison CM2 chondrite [7]. Nevertheless, it has to be taken into account that the some C-H compounds could be also due to terrestrial contamination.

## References

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