Application of portable Raman spectroscopy in exobiology: In situ identification of sulfate minerals

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Raman spectroscopy has been used as a powerful tool for the identification of various minerals and organic compounds. The advantages and relative simplicity made this method a promising choice in the future exploration missions to Mars [1]. The deposits of aqueous minerals including iron, magnesium and calcium sulfates have been found on the Martian surface [2]. With the development of miniaturized Raman spectrometers there is a need for evaluation of Raman spectroscopy as a method of identification of sulfates under geological conditions. In our study, we focus on the use of miniaturized Raman spectrometers equipped with different excitation sources to detect sulfates at few Mars analogue sites in Bohemian massif.





Valachov, Czech Republic.

An example of results is shown in the figure. In general, sulfate phases are detectable by the Raman spectra collected under unfavourable conditions. Common sulfates (gypsum etc.) are easily identified. Identification of complex sulfates such as copiapite-group minerals is discussed.

[1] Villar & Edwards (2006) Anal. Bioanal. Chem. **384**, 100-113 [2] Gaillard et al. (2013) Space Sci. Rev. **174**, 251-300