

Vibrational Spectroscopic Identification of Beta-Carotene in Usnic Acid and PAHs as a Potential Martian Analogue

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Abstract : Raman spectroscopy is currently a part of the instrumentation suite of the ESA ExoMars mission for the remote detection of life signatures in the Martian surface and subsurface. Terrestrial analogues of Martian sites have been identified and the biogeological modifications incurred as a result of extremophilic activity have been studied. Analytical instrumentation protocols for the unequivocal detection of biomarkers in suitable geological matrices are critical for future unmanned explorations, including the forthcoming ESA ExoMars mission to search for life on Mars scheduled for 2018 and Raman spectroscopy is currently a part of the Pasteur instrumentation suite of this mission. Here, Raman spectroscopy using 785nm excitation was evaluated for determining various concentrations of beta-carotene in admixture with polyaromatic hydrocarbons and usnic acid have been investigated by Raman microspectrometry to determine the lowest levels detectable in simulation of their potential identification remotely in geobiological conditions in Martian scenarios. Information from this study will be important for the development of a miniaturized Raman instrument for targeting Martian sites where the biosignatures of relict or extant life could remain in the geological record.

Keywords : raman spectroscopy, mars-analog, beta-carotene, PAHs

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