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Raman Spectroscopy of Amino acids and other biomarkers on Mars.

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Do you plan a submission of a full paper for publication in *Origins of Life and Evolution of Biospheres*: No

Abstract

In the search for life elsewhere in the Solar System, our nearest planetary neighbour, Mars, offers great potential for finding past or present life. Whether life is extant or not, signs of biological activity can be inferred through the detection of specific biomarkers, such as amino acids.

Raman spectroscopy is an extremely effective method of detecting biomarkers. It is non-destructive and is used to identify different molecular species through observations of the Raman shift created by the bonds within the molecule.

Amino acids that are part of a biological system could provide potential evidence of life on Mars. It is thought that amino acids could survive in the sub-surface of Mars, making them a high-priority biomarker candidate. Terrestrial life utilises homochiral amino acids, and if detected on Mars it would provide an important piece of evidence for the case for life on Mars.

In this work, a number of biologically essential amino acids that are utilised in terrestrial organisms will be studied using Raman spectroscopy. We aim to characterise the Raman signature for these molecules in detail in order to aid interpretation of results from future Mars landers, and presented here are initial results from the preliminary investigations.

Further work will extend to other high-priority biomarkers that may be found at the surface/sub-surface of Mars.

Keywords: biomarkers, life, Raman, amino acids, Mars, habitability, astrobiology