

Time-resolved Raman spectroscopy for the detection of biomarkers among layered minerals

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Mars is one of the prime candidates for having spawned life in our Solar system. Any possible current life on Mars must withstand extreme drought, radiation levels and temperature variations. Earth has examples of organisms that fit this profile, such as *D. radiodurans* [1], and we use these bacteria as a proxy for developing methods to detect life on Mars.

High radiation levels lead life to 'hide' beneath a planet's surface. Hence bacteria were measured through several millimetre thick minerals by means of time-resolved Raman spectroscopy (TRRS). In a TRRS experiment, a pulsed laser and delay-adjustable gated detection system are used to selectively detect the much weaker signals from deeper layers while the stronger, unwanted signals from superficial layers are rejected. Coincidentally, also longer-lived (nanoseconds) fluorescence signals are suppressed. Our end goals are to optimise our setup for the detection of biomarkers in a mineral environment and to develop future methods that increase the capability to detect possible life on Mars.

References

- [1] D. Slade and M. Radman, *Microbiol. Mol. Biol. Rev.*, vol. 75, no. 1, pp. 133–191, Mar. 2011.

Additional info

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