

Compact Remote Time-Resolved Raman and Fluorescence Spectrometer for Planetary Missions.

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Abstract. A wide array of science questions concerning planetary bodies can be addressed by understanding the mineralogy and composition of the surface. Raman spectroscopy is a powerful and widely used technique for characterizing the structure and chemistry of molecular compounds, and is well suited to answer a wide array of planetary science questions. We have developed a compact remote laser Raman system that is capable of obtaining high quality spectra at ranges over 100 meters. The system also collects time resolved fluorescence data for sensitive detection of organics and fluorescent minerals. Raman spectroscopy can detect and characterize the chemistry of many of the major and minor minerals of interest to planetary science. In terms of lunar science, this characterization includes the major element ratios of the major minerals (for example, the forsterite content of olivine), and the chemistry of rarer minerals such as spinel. Raman spectroscopy can also be used to characterize glasses that might be featured at a landing site at a pyroclastic deposit.