**Detection of Biomolecules, Organics, and Minerals on Mars using Fluorescence**

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**Abstract:**

We propose fluorescence as a method to detect polycyclic aromatic hydrocarbons and other organic molecules, as well as minerals on the surface of Mars. Our instrument design is adapted from the ChemCam instrument which is currently on the Mars Science Lander mission and thus most of the primary components are currently flight qualified for Mars surface operations, significantly reducing development costs. The major change compared to ChemCam is the frequency muliplexing of the 1064 nm laser to wavelengths suitable for fluorescence excitation (266 nm, 355 nm, and 532 nm). We present fluorescence spectrum for a variety of organics and minerals relevant to the surface of Mars. Preliminary results show minerals already discovered on Mars, such as perchlorate, fluoresce highest when excited by 355 nm. Also we demonstrate that polycyclic aromatic hydrocarbons, such as those present in Martian meteorites, are highly fluorescent at wavelengths in the ultraviolet (266 nm, 355 nm), but not as much in the visible (532 nm). We conclude that fluorescence is an important method for Mars applications and with the standoff detection of organics and minerals, an excellent triage instrument for sample return target selection. The instrument approach described in this paper builds on existing hardware and offers high scientific return for minimal cost for future missions.