STANDOFF CATEGORIZATION OF ORGANICS FOR PLANETARY EXPLORATION

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By
Dalton Muchow

Thesis Advisor
Dr. Anupam Misra

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ABSTRACT

Using passive reflectance spectroscopy, organic material has been detected on near-Earth asteroids, furthering the search for life elsewhere in the universe. This discovery is a significant step, but quickly categorizing found organics as biogenic "life" or non-biogenic organic molecules allows scientists and the media to appropriately respond to findings. Our near-UV biofinder has proven its ability to rapidly and remotely distinguish organic fluorescence from mineral fluorescence, and shows potential to further separate biogenic from non-biogenic organics. Using Time Resolved Laser Induced Native Fluorescence (TRLINF) and Fluorescence Spectroscopy, the spectra and response times of biogenic (leaves, shells, etc.) and non-biogenic (polypropylene, polyethylene, benzene, etc.) materials can be compared. The ability to conclusively categorize organic material with spectra collected from long distances alone would be a significant improvement in the automation, efficiency, and contamination mitigation of life-finding projects. These preliminary results show potential for zones of limited response, where subcategories of organics can be partially classified by their spectral response. Notably, a zone of interest between 380nm - 400nm while using 355nm laser excitation shows responses of all tested material groups, except biogenic substances. Accurately categorizing newly discovered organic materials based on spectral data alone will allow scientists to accurately report on the composition and significance of their findings to the scientific community for further research and general population interests.