

Opportunity Title: Quantitative Mineralogy and Life Detection using Raman and LIBS Spectroscopy

Opportunity Reference Code: 0061-NPP-NOV23-JPL-PlanetSci

Organization: National Aeronautics and Space Administration (NASA)

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Application Deadline: 11/1/2023 6:00:59 PM Eastern Time Zone

Description: Our group's primary research focus is on the development of advanced in-situ spectrometers for planetary science. Currently we have several on-going projects to develop novel Raman spectrometers, Laser Induced Breakdown (LIBS) spectrometers, laser delivery systems, collection optics and probeheads.

We are seeking Postdoctoral Scholars interested in participating in the development of an integrated Raman/LIBS spectrometer that can measure spectra at standoff distances ranging from several centimeters to several meters. The goal of this project is to demonstrate that LIBS/Raman spectra can be used to perform quantitative mineralogy and elemental analysis in extreme environments. One goal is to demonstrate quantitative mineralogy/elemental analysis of rocks samples held in a simulated Venus surface environment of 465°C and 93 bar. Another goal is to demonstrate that this technique is viable in very cold, high-pressure liquid environments that may be present beneath ice-covered oceans of Europa or Enceladus.

Postdoctoral scholars are also sought to assist in the development of specialized ultraviolet Raman spectrometers designed to detect the resonant enhanced Raman spectra of conjugated or aromatic organic compounds representing signatures of life within Mars, Europa, Enceladus, Titan or other bodies in the solar system where life may exist. The successful candidate will be involved in the development of a multi-wavelength UV source as well as a UV Echelle Raman spectrometer enabling resonant Raman spectra of samples illuminated with multiple UV wavelengths to be processed simultaneously. Alternatively, Postdoctoral scholars may wish to explore the development of specialized probeheads utilizing metalized or liquid core optical waveguides to enhance sensitivity or utility of Raman, fluorescence, LIBS, or atomic absorption in-situ instruments.

All of the projects above are quite lab oriented. Candidates must have a strong interest in hands-on laboratory-based instrument development work. Candidates with expertise in lasers, optical instrument design, electronics, atomic emission spectroscopy, molecular spectroscopy, and chemometric techniques (PLS, nonlinear PLS, PLS-SVC, Kernel based methods, etc) are encouraged to apply.

Location:

Jet Propulsion Laboratory
Pasadena, California

Field of Science: Planetary Science



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Advisors:

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Applications with citizens from Designated Countries will not be accepted at this time, unless they are Legal Permanent Residents of the United States. A complete list of Designated Countries can be found at: <https://www.nasa.gov/oiiir/export-control>.

Eligibility is currently open to:

- U.S. Citizens;
- U.S. Lawful Permanent Residents (LPR);
- Foreign Nationals eligible for an Exchange Visitor J-1 visa status; and,
- Applicants for LPR, asylees, or refugees in the U.S. at the time of application with 1) a valid EAD card and 2) I-485 or I-589 forms in pending status

This opportunity may require the following: 1- Mandatory drug testing; 2-Random drug testing; 3- Testing prior to initiation of fellowship appointment.

Eligibility Requirements • **Degree:** Doctoral Degree.