

# Compact Raman Spectrometer For In-Situ Planetary Chemistry, Phase I Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)



## ABSTRACT

In this proposal, we demonstrate a new Raman imaging sensor based on a compact, CCD-mounted spectrometer. This enables high sensitivity and specificity for UV-Raman that will be capable of full-frame imaging, thus reducing size, weight, and power requirements, as well as eliminating the need for mechanical scanning and actuators to acquire data across a 2-dimensional image. The proposed program will establish the optical model and tools to estimate system performance, fabrication requirement and tolerance, formulate calibration procedure and evaluation criteria, develop critical optical component fabrication techniques and procedure, and chart the road for a Raman imager with improved performance that can be obtained with the state of the art fabrication techniques. In Phase II we will demonstrate a prototype imaging system and present a plan to infuse the technology into a NASA program.

## ANTICIPATED BENEFITS

### To NASA funded missions:

Potential NASA Commercial Applications: Composition analysis and mapping is one of the central tasks for planetary explorations. The proposed method and rugged instrument can provide fast material identification regarding its molecular composition during planetary and asteroidal exploration missions. New information provided by proposed approach can help understand the history and future of planets/moons/asteroids.

### To the commercial space industry:

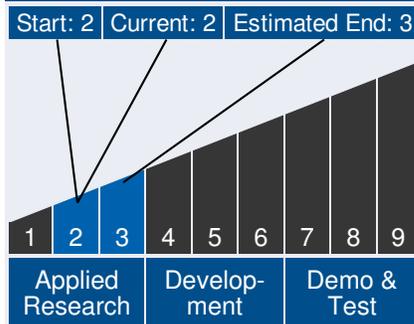
Potential Non-NASA Commercial Applications: The proposed method and instrument can be used for many applications - security/military: chemical and explosive detection and identification; manufacturing industry: non-destructive detection/evaluation; pharmaceutical: composition analysis, counterfeit detection, compound distribution, powder content and purity, polymorphic forms identification, contaminant



## Table of Contents

Abstract . . . . .	1
Anticipated Benefits . . . . .	1
Technology Maturity . . . . .	1
Management Team . . . . .	1
U.S. Work Locations and Key Partners . . . . .	2
Technology Areas . . . . .	2
Image Gallery . . . . .	3
Details for Technology 1 . . . . .	3

## Technology Maturity



## Management Team

### Program Executives:

- Joseph Grant
- Laguduva Kubendran

### Program Manager:

- Carlos Torrez

*Continued on following page.*

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detection and identification; Medicine and Life Science: bio-compatibility study, DNA/RNA analysis, drug/cell interactions study, single cell analysis; Geology and Mineralogy: gemstone and mineral identification.

## Management Team *(cont.)*

### Principal Investigator:

- Feng Jin

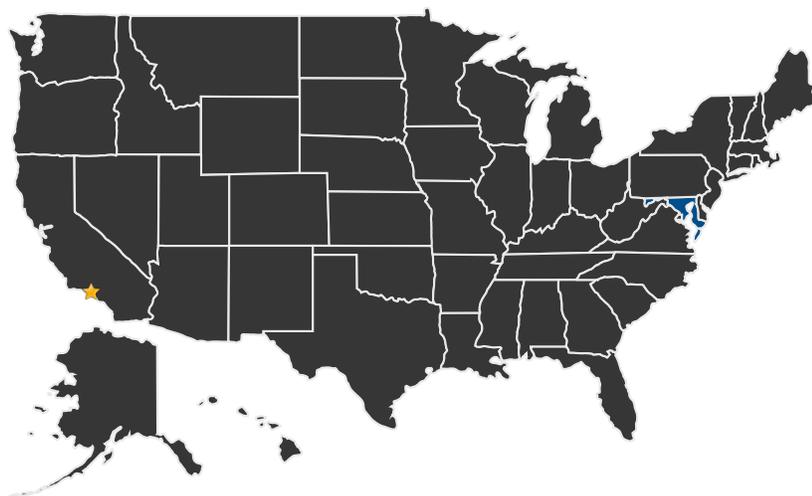
## Technology Areas

### Primary Technology Area:

Science Instruments, Observatories, and Sensor Systems (TA 8)

- └ Remote Sensing Instruments and Sensors (TA 8.1)
  - └ Detectors and Focal Planes (TA 8.1.1)

## U.S. WORK LOCATIONS AND KEY PARTNERS



■ U.S. States  
With Work

★ Lead Center:  
Jet Propulsion Laboratory

### Other Organizations Performing Work:

- Brimrose Technology Corporation (Sparks, MD)

## PROJECT LIBRARY

### Presentations

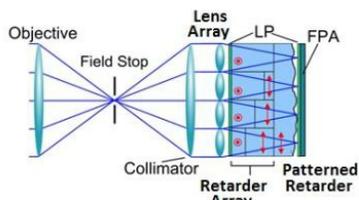
- Briefing Chart
  - (<http://techport.nasa.gov:80/file/23494>)

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## IMAGE GALLERY



Compact Rugged Raman Spectrometer

*Compact Raman Spectrometer For In-Situ Planetary Chemistry, Phase I*

## DETAILS FOR TECHNOLOGY 1

### Technology Title

Compact Raman Spectrometer For In-Situ Planetary Chemistry, Phase I

### Potential Applications

Composition analysis and mapping is one of the central tasks for planetary explorations. The proposed method and rugged instrument can provide fast material identification regarding its molecular composition during planetary and asteroidal exploration missions. New information provided by proposed approach can help understand the history and future of planets/moons/asteroids.