

Portable Raman Spectrometer Requirements

NASA Langley Research Center requires a portable Raman spectrometer for identifying chemical species on surfaces. This system will be used primarily for identifying the presence of molecular films on various spacecraft and equipment surfaces including optics, structures, multi-layered insulation (MLI) blankets, optical witness plates, and stainless steel thermal vacuum cryogenic collection surfaces. This system will help analysts determine the chemical constituents of a film to determine if the film is contamination, and aid analysts in determining the source of contamination. The system shall meet the following requirements:

- 1) The system shall have a portable Raman spectrometer with the following requirements:
 - a) System is cooled via Thermoelectric cooler
 - b) 1064 nm excitation laser. Laser power must be tunable down to 1%.
 - c) SMA coupled detection covering 250-2500 cm^{-1} of Raman shift at a center resolution of around 9.5 cm^{-1} at 1296 nm using a Pen Lamp
 - d) Option to make measurements down to 65 cm^{-1}
 - e) Double Pass transmission f/2 spectrograph
 - f) Fiber optic Raman probe
 - g) Spectrometer must be portable and weigh less than 7 pounds
- 2) The system shall have a video microscope to attach to the Raman spectrometer with the following requirements:
 - a) 20X objective with a working distance of at least 8.8 mm
 - b) Provides manual, coarse, and fine XYZ adjustments
 - c) Coaxial LED illuminator for target sample alignment
 - d) Video camera for sample viewing
 - e) Accepts standard microscope objectives
 - f) Options for dual wavelength, tripod mounting, and positional adjustment
 - g) Video microscope must weigh less than 15 pounds
- 3) The system shall come with software with the following requirements:
 - a) Windows 7 or newer based operating software
 - b) Performs emission, absorbance, percent transmission/reflection and Raman measurements
 - c) Offers Peak Analysis options: center wavelength, integrated power density, and FWHM calculations
 - d) Contains basic spectral math: addition, subtraction, multiplication, and division
 - e) Includes derivative algorithms: point differences, Savitzky-Golay, and differential
 - f) Includes Peak Smoothing algorithms: FFT, Savitzky-Golay, and Boxcar
 - g) Features manual and automatic baseline correction
 - h) Offers spectral file formats: txt, spc, & csv
 - i) Exports Spectral Files to Excel