Instrument Standard Operating Procedure

Raman Reflex

Last Updated: 6/25/2020

(Under Construction)

You must be a “Qualified Self-User” to operate this instrument independently.

You must be on the labs “Instrument Reservation Schedule” before touching the instrument for any reason.

Any problems, STOP, Post a note on the instrument and send an email to mtim@mit.edu immediately.

Do not perform any maintenance.

Do not adjust any optics.

Instrument Hazards:
Lasers, Cryogenic Liquids Chemicals & Electricity.

Laser Safety:
Anyone operating the laser must have attended the MIT Radiation Protection Offices Laser Safety Training. Call X2-EHSS to schedule a class.
Lasers: Class 3B, Interlocked system (No exposed laser beams).
Wavelength and Power: 785nm 100 mw, 533nm 50 mw, 437nm 25 mw.

Required Apparel:
Safety Glasses, Laser Safety Glasses when interlocks are disabled.
Wear clean gloves when handling optics.

Check out the system when you arrive:
If you encounter any problems: Stop work and send Tim (mtim@mit.edu) an email immediately.

1. Lasers, Spectrometer and Microscope Laser Safety Enclosures – Closed.
2. Computer – On
3. Software - Closed.
4. Spectrometer Power – Always On
Operation:

**Logon to computer:**
- User name: Admin
- Password: 134139

Open the software - “Wire”.
Turn the Lasers on (Key).
785nm laser must warmup ~60 seconds before performing health check.

**Verify Performance:**
Run the Health Check
On the machine status toolbar:
Choose your desired Laser Wavelength & Grating.
- 473nm & 532nm – Regular or Confocal
- 785nm – Line Focus Only
**Perform your work:**

**Save your data:**
Walk away with a copy of your data if it is important to you.
   Use a USB or the computers internet connection to transfer your data.

**Data Analysis:**

Wire software is available to users.
Available on the desktop of the Raman computer.
**Shutdown:**

Close the Software
Turn off the Lasers (Key)

Cleanup.
Disengage CORAL.
Lab Door Closed.

**Problems?**
Send mtim@mit.edu an email immediately.
It is OK to try to resolve the problem by restarting the system.

Note: If laser interlock is tripped the system will have to be shutdown and restarted.

**Shutdown the system:**
Close the shutter in the software.
Close the software.
Turn the Main Power Off.
Turn the Lasers (Key) Off.

**Restart The System After Power Was Shutoff:**
After a power outage or a tripped laser interlock you will have to restart the system.
Turn the Main Power ON.
Open the software (Wire).
Choose the top option (initialize Motors).
Turn on the Lasers (Key).
Raman Polarization Measurement Configuration Modes

Polarized – ½ lambda waveplate - Linear
Depolarized – ¼ lambda waveplate - Circular

Isotropic Samples
Depolarized Raman
   Incident – Depolarized
   Analyzer – Polarized X or Y

Anisotropic Samples
Polarized Raman
   Incident – Polarized X and Y
   Analyzer – Polarized X and Y
   Rotatable Sample Stage

Angle Resolved Polarized Raman
   Incident – Linear Polarized (1/2 waveplate) X and Y
   Analyzer – Linear Polarized (1/2 Waveplate) 0-190 degrees
   Rotatable Sample Stage
**Vendor Contacts:**

**Sample info:**

**Other Instruments:**
Kaiser Hololab 5000 Modular Research Raman Microscope & Spectrometer
  785nm Excitation
Harvard CNS
MIT Institute for Soldier Nanotechnology
ACKNOWLEDGMENT OF SUPPORT:
CMSE requires that all publications and patents resulting from work done under this project or with the assistance of the CMSE Facilities, be acknowledged. Please be certain that one (or a combination) of the following statements is included in papers with support from CMSE:

"This work was supported primarily by the MRSEC Program of the National Science Foundation under award number DMR - 1419807."

-or-

"This work was supported in part by the MRSEC Program of the National Science Foundation under award number DMR - 1419807."

-or-

"This work made use of the Shared Experimental Facilities supported in part by the MRSEC Program of the National Science Foundation under award number DMR - 1419807."
**Instrument Specifics:**  
Renishaw Invia Reflex Raman Confocal Microscope

This is a fully automated confocal Raman microscope system with three laser excitation lines a motorized stage and open sample compartment to accommodate cryostats. A Temperature controlled microscope stage is available for temperature dependent measurements.

**Raman Reflex Beampath**

![Raman Reflex Beampath Diagram]

**Data Acquisition Modes:**
Point Mapping  
Imaging - Stream HR fast imaging  
Depth Profiling  
Polarization  
Time Dependent  
Temperature Dependent  
Photoluminescence

**Laser Sources:**
- 473nm  
  - 25mw Linear & Circular  
- 532nm  
  - 50mw automated rotate linear  
- 785nm  
  - 100mw Linear & Circular

**Detector:**
- 1” CCD array, Deep Depletion for enhanced IR Range  
- 400-1050nm, 1024 X 256 pixel

**Gratings:**
- 600l/mm, 1200l/mm, 2400l/mm

**Rayleigh Filters:**
- 473nm edge  
  - 10%@150cm-1 shift, for Photoluminescence measurements
532nm eclipse  <15cm-1 shift, Stokes & Antistokes  
532nm edge  ~100cm-1,  
785nm edge  10%@50cm-1 Rectangle w/o aperture

**Microscope:**
Leica Optical Microscope  
Infinity Corrected, 200mm Tube Length  
Free Space with enclosure

**Objectives:**
Semi par-focal

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<th>Objective</th>
<th>Opening</th>
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<tr>
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Reflected Light Polarization

**Microscope Stages:**
Renishaw HSES motorized stage  
Step Size: 100nm  
Stage Travel: 112mm x 76mm  
**Rotating Microscope stage** - polarization experiments  
**Temperature controlled microscope stage**  
Linkam THMS600 (-196degC to 600degC).  
Macro Sampling Set:  
Cuvettes, Powders, Capillaries, Etc.  
Computer & Monitor  
HP Computer  
Monitor 22”  
Reference Spectra:  
Organic Polymers, Inorganic materials, Sample substrates  
Features:  
Data Analysis Software available to users.

******End******