Lab Safety Plan for Optics Room (Rm117)

1. Basic Information

1.1 Laboratory Locations Covered by this Plan. Nanophotonics Center (Engineering & Technology Lab Building) Rm 117 (Optics Room).

1.2 Location of (M)SDSs, and any Other Laboratory Documents for this Room

In the Literature Holder mounted on the wall next to the door

2. Emergency Assistance Information

2.1 Group's Emergency Contact Information

Prof. Jing Li 806-401-9289

Weiping Zhao 806-317-5636

2.2 Advisors

Prof. Hongxing Jiang 806-834-5739 (Office)

Prof. Jingyu Lin 806-834-5383 (Office)

2.3 Secretary

Qing Feng 806-834-2094 (Office)

2.4 TTU Environmental Health and Safety (EH&S)

Daytime Emergencies (M-F, 8:00 am -5:00 pm) 806-742-3876

Non-daytime Emergencies (24 hrs/day, 7 days/week) 806-742-3328

2.5 TTU Emergency Maintenance

Any Time 806-742-3328

2.6 TTU Police (UPD)

Emergency 9-911

Non-Emergency 806-742-3931

3. Required Training for Working in this Room

3.1 Safety Awareness Training

3.2 Hazard Communication

3.3 Chemical Hygiene Plan Training

3.4 Laboratory Safety

3.5 Laser Safety

4. Standard Operating Procedures (Attached)

5. Record of Training (in the literature holder mounted on the wall next to the door)

6. What hazards are present in lab

7. Acknowledgement Sheet

Operation of excimer laser

1. This excimer laser is a high power laser with light emission at 193 nm. It is a class IV.
2. Before turn on the laser system, make sure you are wearing protective eyewear and turn the laser indicator on.
3. Turn on the electrical power of excimer laser by turn the red knob from “OFF” to “ON”.
4. Turn on the control panel by switching key from “O” to “I”.
5. Wait for 8 minutes to warm up the laser system.
6. Turn on the shut by press the button “RUN/STOP” on the control panel first, and then press “EXE”. The laser will be on.
7. Check the laser power and frequency; write them down on the notebook.
8. Lift up the shutter to get the laser beam out.
9. Close shutter to block the laser beam.
10. Press “RUN/STOP” button to stop the laser.
11. Press F10 on the control panel to shut off the laser system.
12. Switch key from “I” to “O” to shut off control panel.
13. Turn the power knob from “ON” to “OFF”.

SOP for Lasers in Dr. Jiang's and Dr. Lin's Lab in Nanophotonics Center Do not Open the door, Please Knock first!!!

Class IV Lasers in USE

Control and safety measure

- Un-authorized people not allowed in the room during laser operation
- Door will be locked from inside before turning the laser ON
- Laser will be shut down before the door is opened after use

Verdi-10

- Turn the chiller ON
- Key Open & wait until diode current reaches ~17amps
- Wear protective eyewear for specific wavelength (Required !!!)
- Lock the door and do not allow un-authorized people in the room - Shutter open

Mira 900

- Monitor output power and pulsing through controller

- Optimize output power by adjusting the input optics and slit widths

Dr. Jiang and Dr. Lin's Optics Lab in Nanophotonics Center

Class IV Lasers in USE !!!

Do not Open the door, Please Knock first!

Control and safety measure

- Un-authorized people not allowed in the room during laser operation
- Door will be locked from inside before turning the laser ON - Laser will be shut down before the door is opened

******* Operation Procedure for Near-field Scanning Optical Microscope ********

Read some information about NSOM, there is a good example on Olympus' website:
http://www.olympusmicro.com/primer/techniques/nearfield/nearfieldintro.html.
Also read the manual and Ashok's User guide instructions

Checking before turn on the system - long time no use and safety

1. Check Wiring - use our own diagram
2. Check Probe - properly mounted, and then check under microscope 3. Check knobs position on TOPAZ to protect the device from high voltage - see NSOM manual for default number
4. After switching on, check settings in Quartz software - contact mode & 70 micron
5. Check that the calibration file is correct, or perform the calibration process

Initialization

1. Turn everything on, TOPAZ-> Quartz software-> frequency generator & signal processing
   (order is fine, just read head if software is turned on first)
2. Scan probe frequency - from 33KHz downward
3. Setup Quartz and TOPAZ
   a. probe frequency (through Gain & Offset)
   b. reference
   c. feedback PID (P can be high in the presence of low pass filter)
   d. scan direction & size
   e. scan time (10-30ms for 50 micron spatial interval, proportional reduce with size, > a few ms)

Routine measurement procedure

1. Load sample - carefully put the sample on the sapphire piece
2. align sample position (X-Y) - through inertial movement of the lower scaner (check with microscope)
3. Bring the tip near surface with screw - Don't let them touch! The same as AFM
4. Use Auto approach on TOPAZ - Never use "coarse approach", it has the same speed and will malfunction sometimes.
5. Scan - optimize if needed (mostly proportional gain & scan time)
6. withdraw the tip use "coarse retract"

Calibration - tip or mount changed

1. Follow the instructions in the Calibration and Linearization manual 2. Remember to calibrate with each combination of scanner you need, and load the right file with the scan combination.

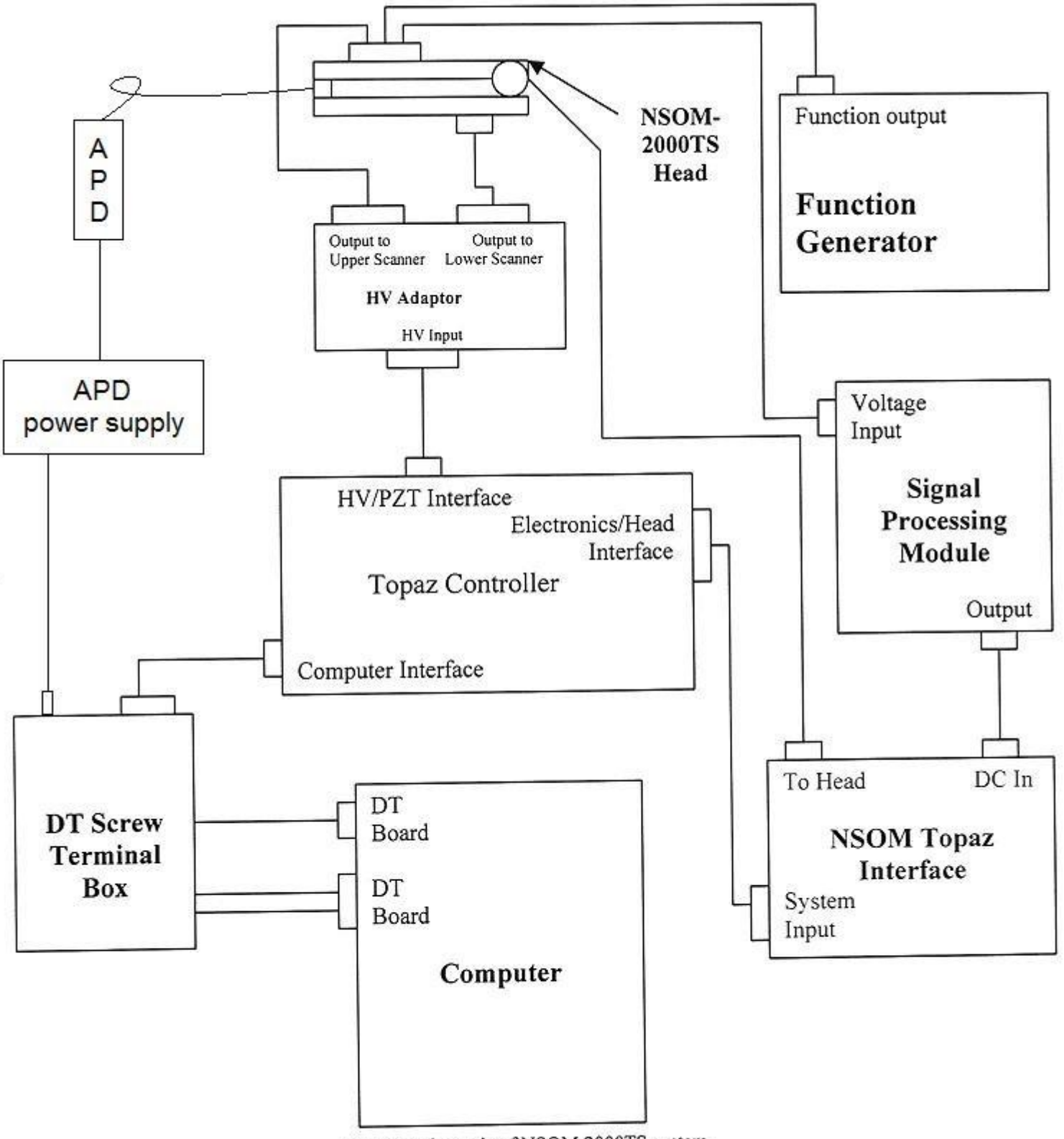

Figure 1: schematic of NSOM-2000TS system

Chemical safety

Precautions:

- Always wear protective clothing, including a face mask, goggles, rubber gloves, and apron when handling corrosive chemicals.

- Use the chemicals only in the designated area;

- Do not transport chemicals around the room in beakers.

- Never pour chemicals back into the original container.

Wikipedia

Storage waste chemical

Store chemicals in accordance with compatibility. Incompatible chemicals coming into contact can generate extremely violent chemical reaction resulting in catastrophic explosions.

- Store waste chemical near the floor to minimize the danger of falling from shelves.
- Store in areas that are cool, dry, and well-ventilated, and away from sunlight.
- Storage area should not be subject to rapid changes in humidity or temperature.

Disposal chemical

Appropriate and adequate disposal of waste is critical in preventing unnecessary risk to the environment, as well as lowering the likelihood of unsafe conditions

Hazardous Waste Disposal Pickup Request Form

-Select waste type –chemical/Bio waste

-Fill out the form completely

-Transaction Number will be sent by email after fill out the pick up request form. Label all containers with this transaction number.

- Once the form submitted, the pick-up will be scheduled for **Tuesday** and **Thursday** accordingly

IN CASE OF ACCIDENTAL CHEMICAL SPILL:

-Only chemical present in Lab 117 is Acetone

-Check MSDS in plastic bin

-Use appropriate PPE. Ensure adequate ventilation. Remove all Sources of oxygen ignition. Stop flow of material if there no risk of Injury.

-Soak up with inert absorbent material (sand, sawdust, ect…). Shovel Into appropriate container for disposal. Do not use sparking tools. Keep out of sewer and waterways.

Lab safety

Note for lab safety training/talk on Nov.20, 2011

Environmental Health & Safety website: http://www.depts.ttu.edu/ehs/Web/

Required documents

- SOPs for anything potentially dangerous – Including how to change MOCVD bubbler, dump sharp/chemical waste, use fume hood
- Lab safety plan – must have, in written form
  – Approved by PI – Risk analysis from EHS (optional) – eg. annual inspection, training
- MSDS
  – Storage(flammable/reactive) – Shipping requirements

Training

- Location of first-aid, fire extinguishers and spill kits
- Personal Protective Equipments (PPE) Gloves: one time use, take off inside-out and d
cover: no exposed skin from wa
coverage, no cloth or absorbent materials Eyewear, respirator/ventilation

- Waste management
  - Waste chemicals: separately stored in labeled containers mark with full name and date.
  - Waste sharp items: special container or sharp edge secured

Training

- Chemical Hygiene
  - – Designated area - fume hood: sash below mark – Separate flammable/reactive/waste inside fume hood – Glassware: rinse after use, label if left in fume hood – Store chemicals accordingly
    - Separate flammable/inflammable, base / acid, HF
    - Specialized cabinet / refrigerator (EHS can provide)
  - – Handle spills: call (2-3876) immediately if unsure
    - Use spill kits if comfortable
  - – HF: especially dangerous, penetrate gloves in seconds.

Hazards Present in Lab 117

- Class IV Laser (Extremely High Powered Laser)
  -Can severely damage eyes and/or skin. Knock on door and ask if Permitable before entering

- Acetone
  -Can cause damage to eyes and skin. Prolonged use with inadequate Ventilation can damage the respiratory system.
  -See MSDS for more information
  -See disposal section if accidental spill occurs

Acknowledgement Sheet

By signing below, you are acknowledging that you have read, understand, and will follow the Safety Plan for Lab 117, Nanophotonics Center:

Dr. Jing Li: _____ Date: _____

Xiaozhang Du: _____ Date: _____

Ahmad Jafari: _____ Date: _____

Jason Guinn: _____ Date: _____