

Engineering Physics / C.E.D.T. Research Hazards Safety Report

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1. Potential hazards in the research projects

1.1 Radiation:

Class 4 high-power ultrafast fiber laser system (1035 nm of wavelength, 1ps of pulse duration, 40 μ J of pulse energy at 100 KHz) is used in ETB 431 lab. Laser pulses with this wavelength adversely affect the retina of human eyes. The pulses of the wavelength are focused by cornea and lens into the retina. Therefore, the protection of eyes should be taken in account when users deal with this laser system. In additional, the risk of laser induced injuries to the skin should be considered.

1.2 Laser ablation:

In general, the removed materials during ablation do not pose an adverse health effects, particular when the scale of ablation is in micrometers (i.e. very small amount of materials are removed). Nevertheless, safety procedure should be followed to keep the lab clean.

1.3 Fire:

Fire may break out due to high power laser hazards.

1.4 Other:

Elevated shelves above fiber laser system could produce potential falling object hazards (oscilloscopes and another lab equipment).

2. Routine operating procedure

2.1 Radiation:

- (1) EOHSS provides laser tanning class that should be attended by everyone who is supposed to work on laser system before operating laser in the lab. The class gives user the potential hazards of using laser systems and how prevent them.
- (2) The manual of fiber laser system must be read carefully before operation system. It gives user a clear idea about laser system and the safe procedures of operating system.
- (3) When the laser system is turned on, the red warning light should be turned on.

- (4) Appropriate laser safety goggles should always be put on during the experiment. Usually, goggles are provided with sufficient OD (optical density) in the spectral region of interest. The glasses with a OD 4+ at 1035 nm should be utilized.
- (5) Even though a user wears appropriate goggles, he/she should avoid bending over so the eyes are at the optical table's level, especially when trying to align the laser system by adjusting optical elements.
- (6) The reflected beam can cause hazard on user. So, remove anything that is reflective such as wristwatch.
- (7) To avoid the risk of laser induced injuries to the skin, user should avoid direct exposure of beam laser especially for a long time.

2.2 Laser ablation:

- (1) Before ablating samples, the user should consult relevant MSDS sheets.
- (2) The ablation should occur in an enclosed chamber where removed materials and any gas are sealed into chamber.

2.3 Fire:

- (1) EOHSS provides fire safety training class that should be attended by everyone who could face fire hazard. The class gives user information about how to prevent a fire in the lab and the corresponding emergency procedure.
- (2) Do not leave hazardous ablation experiments unattended. Communicate hazard to the Fire Department. Consult all MSDS's before handling chemicals.
- (3) Check out the location of fire extinguishers in the lab. Fire extinguishers can be found across room ETB431.

2.4 Other:

- (1) Devices on shelves above fiber laser system should be fixed tightly to protect devices and fiber laser system.
- (2) Some pillars should be fixed on optical table and around fiber laser to prevent system from any device that could fall from shelves.

3. Emergency procedure:

3.1 Radiation

The most possible accident could be laser beam into the eyes. The beam can cause loss of sight. In this case, the laser system should be turned off immediately and call 88 for assistance. User should contact his/her supervisor and EOHSS Laser Safety Office as soon as possible.

3.2 Fire

In case fire, pull Fire Alarm, and then from a safe location, dial 88 for immediate assistance. To evacuate, close doors behind you, and only use stairs. If unsafe to evacuate, shut the door, block cracks and stay low near window. If room door is hot, do not open door, stay low near window. Contact your supervisor and EOHSS as soon as possible.