

NATIONAL UNIVERSITY OF SINGAPORE

Instrument-Based Risk Assessment Form

Name of Department MBI Microscopy Core Location of Lab Level 9 & 10 T-Lab  
 Name of Laboratory All Name of PI All  
 Name of Researcher/LO All Name of Activity/Experiment NA

No	Description/Details	Hazards	Possible Accident / Ill Health & Persons-at-Risk	Existing Risk Control (Mitigation)	Severity	Likelihood (Probability)	Risk Level	Comments	Additional Risk Control	Person Responsible	By (Date)
1	LSM 710 & Leica SP5 and Nikon A1Rs in laser confocal mode	pain when eye gets struck by fast scanning laser beam	the cortical beam has no special collimation and moves fast, hence it is not capable of causing permanent damage in the eye (for single photo machines). Reaction is pain, visual artifacts which may last days, headaches, dizziness.	SOPs: do not run laser with no specimen in place	1	2	2	the same scan mechanism that makes permanent damage virtually impossible also makes it more likely to be struck by the beam as it moves rapidly across space	none planned - laser license covers risk, warning placards have been fitted	LIU Jun 710, LAU Wai Han A1R, DIAO YingYing SP5	in place
2	Spining Disk in laser mode	multiple laser dots scanning across the retina	beam intensity is low and scan is very fast, no permanent burn damage can be caused	laser license & SOP: do not engage laser without specimen in place	1	2	2	if laser is on without specimen in place, one can look into the lens	none	CHIN Jasmine	in place
3	Olympus TIRF in laser mode	medium power laser beam can reach eye during calibration	local injury of the retina from static beam	laser license & SOP: do not engage laser without specimen in place	2	2	4	it only can happen when equipment is faulty - users are trained to report if they accidentally damaged the equipment	penalties for users who do not report damages	MAK Kah Jun	in place
4	STORM in laser mode	high power laser beam can reach eye	medium area damage of the retina	laser license & training for calibration & laser goggles provided & instrument SOPs	2	2	4	without instrument damage, the beam will not exit forward toward the user but instrument damage has occurred in the past	goggles in place, warning signs in place, shield to be intalled by January 2015	MAK Kah Jun	shield delivered - install January 2015
5	SIM scanner	high power laser beam can reach eye during calibration	medium area retina damage	ban of user-based calibration & laser goggles provided & laser license & three-times-a-week maintenance	2	3	6	calibration is strictly off limits for users	all measures and rules in place, additional shield with OD3+ will be installed by January 2015	LIU Jun	January 2015
6	PALM & iLAS2 in laser mode	forward exiting TIRF beam when laser interlocks are tampered with	strong irritation and local damage of retina due to strong laser beam	system are laser-locked, beam will interrupt when doors are opened	2	1	2	users have repeatedly tampered with the interlocks and do not remove the tampering when done with work	penalties for users who are found tampering with the interlocks	CHIN Jasmine iLas2, MAK Kah Jun ELYRA & Olympus TIRF	in place
7	lamp houses	very hot lamp houses when in operation	skin burns upon touching casing of arc burner houses and incandescent housings. No risks for LED and solid state housings	user are informed during training that housing is hot, housing is not under user maintenance	1	3	3	has occurred repeatedly but damage is very, very light	slow replacement of incandescent light houses by cold LEDs, all new HID sources have fans and are cold	MAK Kah Jun	upon demand when current systems are phased out
8	arc burners and UV sources	UV light emitted from burner can damage skin and injure eyes after extended exposure	360nm light causes protein damage and can cause DNA damage. It also injures the unprotected eye	users are strictly forbidden to open housings of burners. Our burners also have a deep UV cutoff but need to deliver 360nm light	2	1	2	no direct eye exposure if specimen is properly mounted	users are strictly forbidden to open housings of burners. Our burners also have a deep UV cutoff but need to deliver 360nm light	CHIN Jasmine and MAK Kah Jun	in place
9	mechanical motorized stages	fingers and hair can get caught in fast moving stage frame	clamping and pulling risk, motors are strong enough for user not being able to overwhelm them	SOPs: users should only engage automatic stage modes since experiment is set up	1	2	2	biggest hazard is being trapped	none	admin of microscope	in place
10	microinjectors	pricking hazard with fine glass needle, severed skin, glass residue in skin, worst case sample injection into victim	the mechanical injury will be nearly negligible. Biosafety risk can be substantially higher but cannot be assessed and is not part of the microscopy schedule	follow simple safety procedure of not touching sample once set up - use mechanics and motors to drive and manipulate sample	1	1	1	covered by sharps schedule - hazard is much bigger as long as outside of the injector	follow SOPs, do not engage drive while touching the sample	MAK Kah Jun	in place
11	sharps	breaking cover slips can cut	local skin injury due to thin glass fragments	standard sharps handling schedule	1	2	2	covered by sharps schedule	none	user	in place
12	fire extinguishing system	oxygen shortage, sot inhalation, flame injury in case of fire	strong irritation, burns, death in case of fire	siren & FM200 exothermic suppressor system & sprinkler & automated door opener	3	1	3	microscopy core is certified	we prohibit the use of personal audio devices inside the rooms in order to be able to hear the alarms	fire schedule SPFD & MAK Kah Jun for maintenance	in place
13	shrapnel and explosions	glass fragments from hot XBO lamps and chemical reactions	eye injury, skin injury due to shrapnel penetration	no chemical waste allowed in microscopy core, we phased out all XBO burners	2	1	2	no longer possible	individual labs can still use XBOs	user	in place
14	poisons	chemicals used are alcohol, isopropanol and immersion oils	oils are mildly toxic upon ingestions	we offer disposal bins for wipes with oil on it and for over slips with oil on it	1	1	1	we have toxic immersion oils but we do no longer offer them to the users	standard oils only, alcohols evaporate	user	in place
15	tripping hazrd	user can fall over cables and installation as the rooms are dark and crammed	head and body injury, cuts, fractures	instrument back sides are chained off for that purpose	2	1	2	instruments can safely be operated in complete darkness	room lights and flashlights are offered	CHIN Jasmine	in place
16	electric shock	shock from touching mains power with wet hands	nerve damage, heart failure	all power rails are inaccessible, all ports carry error current circuitry	1	3	3	error circuits and certified outlets prevent severe damages	all measures in place	MAK Kah Jun	in place
17	air quality	contamination of air con air	lung irritation, poisoning	we have a two stage filter system in place and monitor the air quality	1	1	1	monitors on central bench	all working	LAU Wai Han	in place

Conducted By Microscopy core team

Approved By

Name Felix Margadant

Signature \_\_\_\_\_

Approval date 20.11.2014

Next Revision date 20.11.2017  
(Maximum 3 years)

		Likelihood		
		Likely	Possibly	Unlikely
Severity	Low	3	2	1
	Med	6	4	2
	High	9	6	3

### Risk = Likelihood x Severity

RISK	DECISION PROCESS
< 3	RISK ACCEPTABLE
3, 4	CONSIDER ADDITIONAL RISK CONTROL
> 4	ADDITIONAL RISK CONTROL REQUIRED

#### Likelihood

- 1 Unlikely
- 2 Possible
- 3 Very Likely

Not likely to occur (has not occurred in the PI's Lab or similar Lab setup.)  
 Possible or known to occur (has occurred in the PI's Lab or Similar Lab setup.)  
 Common or repeating occurrence (has occurred repetitively in the PI's Lab or similar Lab setup.)

#### Severity

- 1 Low
- 2 Medium
- 3 High

(e.g. No injury, injury or ill-health requiring first aid treatment only - includes minor cuts and bruises, irritation, ill-health with temporary discomfort)  
 (e.g. Injury requiring medical treatment or ill-health leading to disability – includes lacerations, burns, sprains, minor fractures, dermatitis, deafness, work-related upper limb disorders)  
 (e.g. Fatal, serious injury or life-threatening occupational disease – includes amputations, major fractures, multiple injuries, occupational cancer, acute poisoning and fatal diseases)

**Severity** - Consider the magnitude/severity of the consequences of the Risk Factor occurring and then list this as 3 (High), 2 (Moderate) or 1 (Low).  
 Severity normally will not change unless there is a physical change to the equipment or process.

**Likelihood** - Team should rely upon their experience and consider realistic scenarios. Listed below are examples of factors that may be considered in determining the likelihood.

- Past experience / incidents
- Complexity of the activity
- Number of personnel involved in the activity (e.g. all personnel, a limited number of trained personnel, etc)
- Frequency of use or execution
- Degree of control (involvement of contractors)
- Strength/completeness of administrative controls
- Sufficiency/formality of training
- Other...