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### Approval process

#### 审批过程

	Name 姓名	Title 职务	Signature 签名	Date 日期
<b>Drafted by</b> 起草人	Xu Guangxiang 许光祥	EHS Officer		
<b>Reviewed by</b> 审阅人	Eran Galor; Shaogang Chen陈少刚; Sehoon Park;	General Director; PVC assistant & Safety coordinator; Academy Safety Representative;		
<b>Approved by</b> 批准人		Campus Safety Committee, PVC meeting;		

### Reversion records

#### 版本历史记录

Rev. No. 版本号	Publication date 出版日期	Rev. reason/ content modified 再版原因/更改内容
01	2020-02-10	New file 新建文件
02	2021-10-01	Regular update定期更新with blue font

### Relevant departments (select relevant departments with a “√”)

#### 相关部门 (用√勾选相关部门)

EHS Office 校园安全办公室	√	Operation Dept. 校园运营部	√	H.R. Dept. 人力资源部	√
RIGS 研究创新和研究生部	√	U.G. Dept. 本科教学部	√	I.T. Dept. 电脑信息部	√

### Relevant documents

#### 相关文件

Waste Management Procedure 《废弃物管理程序》

Leakage Management Regulations 《泄漏管理规定》

Chemical Control Procedure 《化学品管理程序》

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### 1. Purpose 目的

Standardize the laboratory safety management and operation requirements, and thus avoid the occurrence of personal injury, environmental pollution, and property loss accident

规范学院实验室安全管理和操作要求，从而确保避免发生人员伤亡、环境污染和财产损失事故的发生。

### 2. Scope of Application 范围

The Standard Operating Procedure is applicable to the management of all laboratories and various operating activities in Guangdong Technion-Israel Institute of Technology (GTIIT).

本标准操作规程适用于广东以色列理工学院(GTIIT)内所有实验室的管理及各类操作活动。

### 3. Responsibilities 职责

#### Campus Operations Department:

#### 校园运营部:

- Supervise corresponding departments to effectively implement various control measures;  
负责监督各相应部门对各个控制措施的有效落实;
- Collaborate with the lab building administrator for lab emergency training. the lab building administrator shall keep corresponding training records.  
校园运营部协同实验室管理人员操作人员进行实验室安全应急培训，实验室管理员保留培训记录;
- Take responsibility for status maintenance and regular inspection for laboratory fire-fighting facilities and device, so as to meet the fire safety requirements;  
负责实验室消防设施设备的状态维护和定期检查、检验，以满足消防安全要求;
- The airflow direction and the valve rotation direction shall be marked for all gas circuits. The gas laboratory shall be equipped with a gas leakage detector and monitored in 24 hours. It will alarm automatically in case of leakage. EHS is responsible for verifying this device on an external regular basis.  
所有气路应标明气流方向和阀门转向，使用气体实验室内配备有气体泄漏探测器，实施24小时监测，一旦发生泄漏将会自动报警，该装置由校园办公室负责外部定期校验;
- The gas cylinder storage room shall be subject to gas tightness inspection every week. Corresponding inspection records shall be properly kept.  
气瓶储存间应每周做相应的气密性检查，并保存检查记录;

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- The ventilation system (e.g. wind speed, blast capacity and noise of fuming cupboard) shall be inspected and recorded on a regular basis, making sure that the state of the fuming cupboard complies with the laboratory safety and occupational health requirements.

对通风系统，如：通风橱风速、风量和噪音进行定期检测和记录，确保通风橱状态符合实验室安全及职业健康要求。

### Laboratory Manager and PI

#### 实验室负责人

- Formulate the operational safety guidelines or instruction of laboratory equipment.  
负责实验室设备的选型和操作安全指引的制定。
- Take charge of various daily laboratory safety management work, including regular inspection, calibration, and maintenance.  
负责按照实验室各项日常安全管理工作，如：定期检验、校准、维护等等。
- Take charge of various laboratories and job placement for laboratory management personnel.  
负责各实验室及实验室管理人员的工作安排。
- Regularly evaluate the competence and knowledge of laboratory management personnel, and provide corresponding assistance and training.  
定期评估实验室管理人员能力、知识水平，并提供相应的协助和培训。
- Supervise the order of various work, and report abnormal conditions to corresponding management personnel in time.  
监督各项工作的有序开展，存在异常情况时及时汇报相应的管理层人员。

### Laboratory Staff

#### 实验室人员

- Manage all laboratory facilities & equipment and the safety of corresponding operations.  
管理其负责实验室内所有设施设备、以及相应的操作安全工作。
- Abide by relevant management provisions in this article, and finish the assigned work.  
遵守本文的管理规定并完成受指派的工作职能。
- Finish the ability training for the lab management personnel.  
完成实验室管理员所应具备的能力培训。

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- On-time report of abnormal conditions to corresponding laboratory management personnel.  
及时汇报异常情况至相应的实验室管理层人员；
- Accompany external personnel to enter the laboratory, and prohibit the personnel to touch and operate the laboratory instruments and equipment without permission.  
负责外部人员进入实验室陪同工作，禁止未经许可人员触碰操作实验室仪器和设备。

#### 4.0 Terminology 术语

**PPE:** Personal Protective Equipment

**PPE:**个人防护设备

**MSDS:** Material Safety Data Sheet

**MSDS:**化学品安全说明书

**EHA:** Experimental Hazard Analysis; for various steps for job activities in the laboratory, identify probable hazards, formulate corresponding risk elimination, mitigation and control measures, and notify the laboratory personnel

实验危害分析：针对实验室内的作业活动的各个步骤，识别可能产生的危害，制定相应的风险消除、消减和控制措施，并告知实验人员。

**5S:** seiri, seiton, seiso, setketsu and shitsuke (namely arrangement, consolidation, sweeping, cleaning and quality)

**5S:**整理、整顿、清扫、清洁和素养

**IP:** Inspection Plan

**IP:** 检查检验计划

**Chemicals:** reagents, test solutions and samples used in the laboratory; please refer to the *Chemicals Safety Management System* for the management flow of chemicals in the Institute.

**化学品:** 指实验室内使用的试剂、试液和样品，化学品在学院内的管理流程请参照《化学品安全管理制度》要求落实。

**GHS:** Globally Harmonized System of Classification and Labeling of Chemicals

**GHS:**，即全球化学品统一分类和标签制度

**NFPA Code:** National Fire Protection Association Code

**NFPA Code:** 美国消防协会对有害物料标签辨识要求；

**Laboratory safety facilities:** eyewash equipment, sprayer, leak proof sand bucket, anti-oil cloth waste, anti-spontaneous combustion immersion bucket, and other emergency tools as

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well as fire extinguisher, fire hydrant, fire alarm system, gas alarm system and other fire-fighting and fire-protection devices

**实验室安全设施：**洗眼器、喷淋、防泄漏砂桶及防沾有油性物碎布、防自燃的浸泡桶等应急用具；还包括：灭火器、消防栓、火灾报警系统，气体报警系统等消防防火设备设施；

## 5.0 Flow 流程

### 5.1 General Requirements for Lab Safety 实验室一般安全规定：

#### 5.5.1 General Experimental Requirements 实验一般要求：

- A dangerous experiment (the dangerousness shall be judged based on EHA) must be made by two or more people.  
凡有危险性实验（实验危险性根据实验EHA进行判断）必须二人以上进行；
- JHA must be finished before the experiment. Besides, it also needs to identify potential risks, determine all control measures, and understand the operation of various measures.  
在实验开始前，必须完成实验JHA，辨识潜在风险，确定所有相应的控制措施，并了解各项措施的操作；
- When students are making an experiment, the teacher must make sure that all operators are familiar with the operating instructions and safety notes.  
学生实验时，负责老师必须确保所有操作人员熟悉实验操作规程和安全注意事项；
- In the experimental process, the teacher cannot leave the scene without permission.  
实验过程中，实验老师不得擅离现场；
- Before the completion of the experiment, the operator cannot leave the post without permission.  
实验结束前，实验操作人员不得擅自离开实验岗位；
- During and after the experiment, it is prohibited to discharge waste, waste gas and wastewater at random. The said items shall be recovered in sorts according to relevant systems and specifications of the Institute.  
实验期间和之后，禁止随意排放废气、废水、废物，并按学校相关制度规范分类回收；
- After the experiment, the operator cannot leave before making sure the normal safety state of laboratory articles, equipment, and facilities, such as storage of chemicals, power supply, gas source, water source, door, and window.

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实验结束后，实验操作人员必须确保实验室物品、设备设施处于正常的安全状态后方可离开，如：化学品存放、电源、气源、水源、门窗等等；

- Smoking, eating, and drinking are prohibited in the laboratory.  
实验室内禁止吸烟，进食和饮水；
- Food and volatile solvents cannot be stored in the laboratory refrigerator.  
实验室冰箱内禁止存放食品和挥发性溶剂；
- While working in the laboratory, it needs to tie up the hair, and properly collect the ornaments interfering with the experiment.  
在实验室工作时，要扎起长发，收好具妨碍性的首饰；
- After the test, it needs to change the clothes and wash the face and both hands.  
试验后，需要更换实验衣服、清洁手部和面部。
- Remove PPE, before you leave the laboratory to prevent contaminating clean areas.  
离开实验室前，要脱下身上的个人防护用品，防止污染干净区域。
- Do not wear gloves out of the lab building.  
严禁将手套带出实验楼范围。
- Lab coats and personal belongings can be temporarily stored in the storage boxes on each floor of teaching lab building.  
实验服和个人物品可暂存于教学实验楼各层的储物箱内。

### 5.5.2 Laboratory Safety and Emergency Training 实验室安全及应急培训

- Make sure that all laboratory personnel are familiar with potential hazards in the laboratory and in the experimental process, and understand how to cope with and control corresponding hazards;  
确保实验人员熟悉实验室内及实验过程中的潜在危害，并了解如何应对控制相关危害；
- With respect to laboratory emergency, the laboratory personnel shall be guided to deal with abnormal incidents according to the *Emergency Response Plan for Laboratory*.  
实验室应急请根据学院《Emergency Response Plan for Laboratory 实验室应急预案》指导实验室人员处理异常事件；
- All personnel must strictly abide by the EHS rules of the Institute.  
所有人员必须严格遵守学院安全、健康和环境规则。

### 5.5.3 PPE and Safety Signs PPE和安全标志：

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- All personnel into the laboratory (including visitors) shall wear PPE for relevant work and activities according to the laboratory requirements.  
进入实验室的人员(含访客)需按实验室要求佩戴PPE进行工作和活动;
- Minimum safety configuration requirements of the laboratory: safety protective glasses, long-sleeve uniform and working shoes; if special safety requirements are included in the test, relevant devices shall be effectively configured according to the practical situation.  
实验室内最低安全配置要求: 安全防护眼镜、长袖工作服、工作鞋; 如果试验中包含特殊安全要求, 则根据实际情况进行有效配置;
- PPE shall be used within the period of validity, and correctly stored, cleaned and maintained, preventing cross-contamination and failure.  
PPE要在有效期内使用, 并按正确方法存放、清洁和维护, 防止交叉污染和PPE失效;
- For sampling and testing outside the laboratory, PPE shall also be worn in strict accordance with relevant requirements.  
实验室以外的取样、检测工作同样严格要求佩戴PPE;
- Corresponding safety instructions and warning signs shall be pasted at the gate of the laboratory, operating areas and eye-striking equipment use areas.  
在实验室门口、操作区域、设备使用的显著区域张贴相应安全指示和警告标志。

**5.5.4 Regulations for Application Safety of Gas Circuit, High-pressure Gas Cylinder and Ventilation System 气路、高压气瓶和通风系统安全使用规定:**

**a) Gas circuit and gas cylinder 气路、气瓶**

- High-pressure gas cylinder must be stored in the dry and cool places with good ventilation. Open flame and exposure are prohibited. Besides, it shall also be kept away from heat. The gas cylinder shall be vertically placed and provided with a fixed device and corresponding identification.  
高压气瓶须存放在阴凉干燥通风处, 严禁明火, 暴晒, 远离热源; 气瓶应竖直放置, 并有固定装置及标识;
- While opening a gas cylinder, the operator shall stand on the gas outlet side. It shall be slowly opened, so as to reduce friction and prevent static.  
开气瓶时, 人员应站在气出口侧面, 动作要慢, 以减少摩擦, 防止静电产生;

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- Gas cylinder shall be supplied by the units with **qualified certificate**. Before unloading the gas cylinder, it needs to close the cylinder valve and the main gas circuit valve, disassemble the pipeline, and then unload the gas cylinder.

气瓶应有**资质证书**的单位供给，卸下气瓶前，先关闭气瓶阀门以及与总气路的阀门，然后拆卸管路连接，卸下气瓶；

- While installing a gas cylinder, it needs to inspect and confirm no leakage at the cylinder valve. The valve connecting various gas circuits with the main gas circuit shall be maintained closed. Then, the cylinder port shall be connected with a corresponding branch pipe. After confirming the connecting state, it needs to open the cylinder valve and the branch valve connected with the main gas circuit, slightly open the cylinder valve for secondary inspection, and then make sure no leakage at various connections.

装上气瓶时，先检查并确认气瓶阀门处没有漏气，各个气瓶分管与总气路连接的阀门保持“关闭”状态，然后把气瓶接口与相应分管路连接，确定连接状态后，依次打开气瓶阀门和与总气路连接的分管阀门，轻微开启气瓶阀门再次检查并确认各个连接处不存在漏气现象。

**b) Ventilation system通风系统:**

- The fuming cupboard cannot be used for storage of chemicals.  
禁止将通风橱作为化学品的储存柜；
- The rooms with gas circuit (such as gas room, explosion-proof room and solvent, and explosive chemical laboratory) shall be frequently ventilated. The corresponding gas alarm shall be installed, if possible, so as to monitor the concentration of gas in the room.  
布有气路的房间，如：气相室、防爆房间，溶剂型和易制爆等化学品实验室要经常保持通风，条件许可下，应安装相应的气体报警器，监控房间内的气体浓度。

**5.5.5 Regulations for Prevention of Corrosion, Biochemical Infection, Cut, Burn, and Chemical Burn 防止腐蚀、生化感染、化学灼伤、烫伤、割伤的规定:**

- Protective gloves and protective glasses must be worn when taking corrosive chemicals (such as strong acid, strong base, and peroxide).  
取用腐蚀类化学品，如：强酸、强碱、过氧化物时，必须戴防护手套和防护眼镜；
- During manual handling, one hand shall hold the bottom, and the other hand shall hold the bottleneck.  
人工搬运时，应一手托住底部，一手拿住瓶颈；



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- While using handling equipment, it needs to make sure that the chemicals are stably placed (no probability of dump and rollover) and take corresponding preventive measures for collision.

使用搬运设备时，需要确保化学品放置平稳，无倾倒侧翻可能，且设置碰撞保护；

- Corrosive articles cannot be dried in the oven.  
腐蚀性物品禁止在烘箱中干燥；

- While using oven, heating plate and other high-temperature devices, it needs to wear gloves resistant to high temperature. Relevant tools can be used to prevent burn.

使用烘箱，加热板等高温设备时，须穿戴耐高温手套，并可借助工具，以防高温烫伤；

- Handle with care while using, cleaning and drying glassware instruments, so as to prevent cut;

使用、清洗和干燥玻璃仪器时，轻拿轻放，以防玻璃破碎造成割伤；

- Put the cleaned and dried glassware instruments into the drawer or cabinet, and handle with great care;

清洗、干燥后的玻璃仪器放入抽屉或柜中存放，轻拿轻放；

- The broken or damaged glassware instruments must be repaired or discarded immediately (packing materials contaminated by hazardous chemicals shall be disposed of with reference to the *Hazardous Waste Management Procedure*).

破碎或损坏的玻璃仪器必须马上报修或进行废弃处理（沾染危化品包装物处理请参照《危险废弃物管理程序》执行）。

#### 5.5.6 Regulations for Prevention of Poisoning防止中毒的规定:

- When absorbing the toxic sample with a transfer pipette, a rubber ball shall be used.

用移液管吸取有毒样品时，应用橡皮球操作；

- When it is necessary to identify the reagent by smell, the reagent bottle shall be kept away from the nose. Slightly fan with hand, allow the smell to enter the nose on the wind, and prohibit to get the nose close to the bottleneck for identification;

如须用嗅觉鉴别试剂时，应将试剂瓶远离鼻子，以手轻轻煽动，稍让味道飘至嗅觉即可，严禁用鼻子接近瓶口鉴别；

- It is prohibited to eat and drink in the laboratory, and fill the container with food;

严禁在实验室内饮食，严禁使用仪器用于食品承装器皿；

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- After operating the poisonous substance and before leaving the laboratory, the operator must take off the uniform, and wash the face and both hands.  
进行毒物操作工作后，离开实验室前，操作员必须脱去工作服，并完成手部和面部清洁后方可离开实验室；
- Toxic gases (such as steam and pyridine) must be operated in the fuming cupboard. It is prohibited to stretch the head into the fuming cupboard.  
对于有毒气体（蒸汽），如吡啶等，必须在通风橱内操作；严禁将头部伸入通风橱。

#### 5.5.7 Waste Disposal and Identification 废弃物处理和标识:

- Wastes shall be disposed of according to the *Waste Management Procedure* issued by the Institute.  
废弃物处理遵循学院《废弃物管理程序》；
- Waste gas: before daily work, open the laboratory ventilation system for ventilation;  
废气：每天上班前开启实验室排风系统通风；
- Waste reagent and test solution: collect the invalid reagents and test solutions and the tested waste liquids into the waste liquid bucket, and deliver to the Institute Construction Department for disposal;  
废试剂、试液：收集失效的试剂、试液及测试后的废液于废液桶内，交校园建设部处理；
- Wastewater: collect the wastewater polluted by raw materials or products to the special wastewater tank, and deliver to the Institute Construction Department for disposal;  
废水：收集被原料或产品污染的所产生的废水到专门的废水池，交校园建设部处理；
- Discarded samples and other hazardous wastes: collect in the hazardous garbage can, and dispose of in time according to relevant EHS provisions;  
废弃样品及其它有害废弃物：收集到有害垃圾的桶内，及时按照EHS规定处理；
- Reagent bottle: After the reagent is used up, clean the reagent bottle, and put into the harmless garbage can;  
试剂瓶：试剂用完后，用水将试剂瓶冲洗干净，然后放入无害垃圾桶；
- Harmless waste: collect harmless garbage into the garbage can for timely disposal;  
无害废弃物：收集到无害垃圾的桶内，及时处理；

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- Waste PPE: PPE shall be subject to harmful and harmless treatment according to the nature of reagent bottles and samples after harmless treatment.  
废弃PPE: 按照无害化操作后的试剂瓶和样品的性质将PPE分为有害和无害废弃物处理。

## 5.2 Laboratory Environment 实验室环境

- Test environment: The laboratory shall make sure appropriate temperature and humidity. Key environmental conditions shall be monitored. If relevant conditions are not given, the experiment shall be made under indoor temperature. If the temperature has a significant impact on the test results, unless otherwise specified, it is usually 15-25°C, and relative humidity is less than 80%.

测试环境: 实验室应保证合适的温湿度等关键环境条件应被监控。未注明情况则系指在室温下进行; 温度高低对试验结果有显著影响的, 除另有规定外, 一般为15~25°C, 相对湿度小于80%;

- Storage environment: Various chemicals and test consumables shall be stored in the appropriate environment, preventing leakage, pollution, deterioration, and reaction.

储存环境: 各类化学品、测试耗材存放在适合的环境中, 防止泄露、污染, 变质或发生反应;

- 5S: The laboratory shall be clean and in good order, so as to make sure the test safety and high efficiency.

5S: 实验室内应整齐、清洁, 以保证实验室测试工作的安全和高效;

- The laboratory shall be subject to fixed location management. The equipment and articles in the area shall be placed at a fixed point and a fixed location. Besides, identification management shall be specified.

实验室施行定置管理, 对区域内的设备及物品摆放进行定点定位、明确标识管理;

## 5.3 Management of Laboratory Instruments and Equipment 实验室仪器设备管理

- Selection: consider a series of judgment standards, such as instrument performance, safety operating condition, and price;

选型: 考虑一系列的判断标准, 如仪器的性能、安全操作条件、价格等;

- Installation: consider necessary installation conditions; verify the instruments after installation and before official use;

安装: 考虑安装所需的条件; 安装后, 并在正式使用前对仪器进行验证;

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- Calibration: formulate a calibration plan, calibrate by the Institute and/or external supplier, and form a calibration report;  
校准：制定校准计划，由本校和/或外部供应商进行校准，形成校准报告；
- Verification: formulate a verification plan, apply for instrument verification by the Metering Institute, and take corresponding measures for the verification results;  
检定：制定检定计划，申请计量院对仪器进行检定，针对检定结果作出相应措施；
- Maintenance: formulate a preventive maintenance plan, implement regular preventive maintenance by the instrument supplier or the Company, and provide standby instruments and spare parts for key instruments;  
维保：制定预防性维保计划，由仪器供应商或本公司定期实施预防性维保；对于关键仪器应有备用仪器和零件；
- Fault handling: repair, record fault handling in the equipment log, verify the instruments after maintenance, and consider the test results in the fault verification stage;  
故障处理：执行维修，将故障处理记录于设备日志，维修结束后对仪器进行验证，考虑验证故障阶段的测试结果；
- Abandonment: The abandoned instruments shall be subject to timely identification and abandonment. See the *Laboratory Equipment Management Procedure* for detail.  
报废：报废的仪器应及时进行设备标识和进行报废流程。详见《实验室设备管理程序》

#### 5.4 Fixed-assets Management 固定资产管理

- All fixed assets in the laboratory shall be registered and managed.  
实验室所有的固定资产必须进行登记管理；
- The laboratory personnel shall make sure that all fixed assets are in good condition, and repair relevant faults and damages in time.  
实验人员应确保所有的固定资产处于良好的状态，发现故障和损坏需及时报修；
- Violation operation is prohibited for the laboratory instruments. It is prohibited to violently use the laboratory facilities, such as kicking the gate or the cabinet door with foot.  
严禁对实验室仪器进行违规操作，严禁野蛮使用实验室设施如脚踢大门或实验室柜门等；

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- If someone is found to damage fixed assets, corresponding personnel shall be educated. In case of refusal to mend after repeated education or gross violation, relevant personnel will be warned, fined or treated by other means in a written form.

如果发现有人为损坏固定资产的现象，应对相应人员进行教育，屡教不改者或情节严重的，将会以书面警告、罚款、赔偿等方式进行处理。
- Specific requirements are implemented according to the relevant management requirement of the campus logistics department.

具体要求根据学校后勤部的相关管理执行。

## 6.0 Attachments 附件