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Experiment Safety Review Form
Review Number: PS-ESR-535-C12-2012

PRINCIPAL INVESTIGATOR: Abdul Rumaiz
GROUP: NSLS- Detectors
EXT: 2002 **E-MAIL: rumaiz@bnl.gov** **LIFE NUMBER: 23853**

Project Title: Thin film deposition system (Project: development of a planar process hyper Ge detector	
Location(s): 0535	
Area(s): 0535-BASEMENT-B-C12, 0535-BASEMENT-B-C12A	
Proposed Start Date and Duration: 6/15/2012 - 1 years	

SIGNATURES:

Principal Investigator: Abdul Rumaiz	**Date: 6/21/2012**
Experiment Review Coordinator: Lori Stiegler	**Date: 6/21/2012**
Reviewer: Christopher Weilandics	**Date: 6/18/2012**
Reviewer: Frank Zafonte	**Date: 6/6/2012**
Reviewer: Mary Anne Corwin	**Date:**
Reviewer: Deborah Bauer	**Date: 6/18/2012**
Reviewer: Brian Heneveld	**Date: 6/6/2012**
Approval: Lori Stiegler	**Date: 6/21/2012**
Review/Approval (ERC) Comments: 06/21/2012 10:05 AM	
Walkthrough Signature:	**Date:**
Expiration Date (max 1 yr.): 6/21/2013	
FUA Change Required? No	
Fire Rescue Run Card Changes Required? Yes	
Has a NEPA Review been Performed for this Project? No	
Required Approvals (i.e., IACUC, IBC, etc.):	
Project Termination Acceptance Signature: **Comments:**	**Date:**

I. Define the Scope of the Work

A. Description

Apparatus Used:

The clean room houses the deposition chamber, which is a sputtering system for growing materials on wafers in support of Ge based detectors, a microscope, and a bake oven.

The experimental work in the clean room is done with the thin film deposition chamber, consisting of a vacuum system with multigun and UV oxidation capabilities. The UV is confined to the chamber. The deposition chamber is also fed with argon and oxygen cylinders, and has high voltage components. The high voltage is all enclosed. Parts of the chamber are water cooled. The water cooling is interlocked.

New for 2012: Annealing in vacuum, then introduce deuterium (up to 100 mTorr)

The operation is always attended when powered.

A Karl Suss MA6 mask aligner is also used. This has a UV lamp which is used for exposure, which is completely automated.

HF etch is performed for the detectors. The fume hood in the room has been dedicated for this purpose. The required protocals have been posted. HF burn kit and proper PPE are kept in the hood or adjacent to it. A copy of the etching procedure is posted in the clean room C-12. HF training required to perform work in that area.

Equipment manuals or procedures that are controlled documents:

N/A

B. Human Performance Factors

The high voltage equipment and water system are interlocked with vacuum to prevent access. The oxygen lines are leak checked when hooked up. A pressure relief valve (10.2 psia) is also included in the design.

C. Waste Minimization/Pollution Prevention

The quantities of chemicals and gases are minimized.

D. Materials Used /Waste Generated

Materials Used	Disposal Method	Amount per Use	Amount per Year	Comments
Argon	Fugitive	2.00 ltr	10.00 ltr	
Oxygen	Fugitive	2.00 ltr	10.00 ltr	
Ethanol	Fugitive	2.00 ml	100.00 ml	
Acetone	Fugitive	2.00 ml	100.00 ml	
MF 312 electrolyte solution	Hazardous	100.00 ml	1.00 ltr	
Hydrofluoric acid	Hazardous	100.00 ml	1.00 ltr	
TriFluoromethane	Fugitive	1.00 ltr	3.00 ltr	
Deuterium, and D2N gas	Fugitive	1.00 ltr	100.00 ltr	
		0.00	0.00	

II. Identify and Analyze Hazards Associated with the Work

The following hazards were identified:

Physical Hazards:

- Compressed gases (lecture bottles, cylinders, gas lines) (Areas: 0535-BASEMENT-B-C12, 0535-BASEMENT-B-C12, 0535-BASEMENT-B-C12, 0535-BASEMENT-B-C12A, 0535-BASEMENT-B-C12A)
- Flammable liquids (Areas: 0535-BASEMENT-B-C12, 0535-BASEMENT-B-C12, 0535-BASEMENT-B-C12A, 0535-BASEMENT-B-C12A)
- High temperature oven (Other)

Chemical Hazards:

- Chemicals, Hazardous (General)
- Corrosives
- Flammable liquids (Areas: 0535-BASEMENT-B-C12, 0535-BASEMENT-B-C12, 0535-BASEMENT-B-C12, 0535-BASEMENT-B-C12A, 0535-BASEMENT-B-C12A, 0535-BASEMENT-B-C12A)
- Hydrofluoric acid, any use (Areas: 0535-BASEMENT-B-C12, 0535-BASEMENT-B-C12A, 0535-BASEMENT-B-C12A, 0535-BASEMENT-B-C12A)

Ionizing and Non-ionizing Radiation Hazards:

- Ultraviolet sources >1 W (Area: 0535-BASEMENT-B-C12)
- Material Balance Area for deuterium (Other)

Biological Hazards:

- None

Offsite Work:

- None

Other Issues (Security, Notifications, Community, etc.):

- None

Significant Environmental Aspects

- Any amount of hazardous waste generation (Areas: 0535-BASEMENT-B-C12, 0535-BASEMENT-B-C12A, 0535-BASEMENT-B-C12A, 0535-BASEMENT-B-C12A)

III. Develop and Implement Hazard Controls and Assess Risk

A. Physical Hazards, Tasks and Controls

Hazard, Default Controls, Task Specific Info	Risk Level
Hazard: **Compressed gases (lecture bottles, cylinders, gas lines)** **Default Controls:** • Any systems >15psi must be SME Approved • Transport cylinders using a cylinder cart • Secure cylinders to a fixed object/wall • Use regulator, hoses, and components compatible with gas • Use hoses and clamps rated for maximum regulator output or use pressure relief device • Wear safety glasses with side shields when installing/removing/or adjusting regulator • Label piping/tubing	**Negligible (0-20)**
Hazard: **Flammable liquids** **Default Controls:** As for chemicals, plus Store large quantities in Flam. cabinets as required	**Negligible (0-20)**
Hazard: **High temperature oven (Other)** **Default Controls:**	**Negligible (0-20)**

Task Specific Info: Materials are allowed to cool before handling, or gloves are worn	

B. Chemical Hazards, Tasks and Controls

Hazard, Default Controls, Task Specific Info	Risk Level
Hazard: **Chemicals, Hazardous (General)** **Default Controls:** • All operations with large (>250ml, health hazard 3) quantities of hazardous chemicals (pouring, mixing, evaporation, etc) in hood, or use snorkel when hood is impractical • Register Commercial Chemicals in CMS • Work alone after hours only if permitted by supervisor or ESR • Identify containers so contents are identifiable unless being actively used (ex. 1 shift) • Food, beverage, smoking, and cosmetics are prohibited • Handle glassware properly: no mouth suction, no drinking from labware.	**Negligible (0-20)**
Hazard: **Corrosives** **Default Controls:** Use hazardous chemicals controls plus: - Unobstructed access to Emergency Eyewash and Shower	**Negligible (0-20)**
Hazard: **Flammable liquids** **Default Controls:** Use hazardous chemicals controls. Review large quantity storage with Fire Protection Engineer Note location on fire run card and hazard info. placard for storage of solids, greater than 40 pounds; liquids, greater than 5 gallons; gases, greater than 10 pounds	**Negligible (0-20)**
Hazard: **Hydrofluoric acid, any use** **Default Controls:** Use hazardous chemicals controls plus: • HF burn kit (training on use by SHSD rep) • Location of HF to be entered on Fire Run Card and Hazard Information placard • Designated area for HF use and storage must be Posted. • Two people must be in speaking/hearing range at all times that HF is in use. • Off-hours use generally prohibited. Must be approved by OMC Mgr. and Chem Hygiene officer • HF storage in its own secondary containment • PPE: as for corrosives plus: • PPE: Face shield for >2% solutions (1 molar). or if high splash potential. • HF resistant apron (typ. thick butyl rubber or neoprene) • Spill cleanup: <10ml in fume hood can be neutralized with Calcium carbonate or hydroxide • Spill cleanup: >10 ml or any amount outside hood: evacuate and call 2222. • Any worker exposure report to OMC.	**Negligible (0-20)**

C. Environmental Hazards, Tasks and Controls (include on/off site transportation and products/services)

Hazard, Default Controls, Task Specific Info	Risk Level
Hazard: **Any amount of hazardous waste generation** **Default Controls:** Engineering Controls • Waste will be accumulated in chemically compatible containers that appropriately contain/protect the waste. • Waste containers will be closed in a tray (secondary containment) in the Satellite Accumulation	**Negligible (0-20)**

Area (SAA). Administrative Controls • All hazardous waste containers will have a (red) “Hazardous Waste Label” that has the generator’s name and the chemical contents (trade name/formula not acceptable). • All waste will be accumulated in closed containers and kept in an established and posted SAA until ready for transfer to the 90-Day Haz Waste Area for pick-up by Waste Management. • For pick-up by Waste management, complete the Nonradioactive Haz Waste Control Form and consult the 90-Day Area Manager to gain access/transfer the waste to the 90Day Area. Training: Hazardous Waste Gen. (HP-RCRIGEN3). PPE: When handling waste materials follow PPE requirements specified for the specific materials. Comply with the SBMS Subject Area: “Hazardous Waste Management”.	

D. Radiation Hazards, Tasks and Controls

Hazard, Default Controls, Task Specific Info	Risk Level
Hazard: **Ultraviolet sources >1 W** **Default Controls:** Task and source specific. Evaluate below.	**Negligible (0-20)**
Hazard: **Material Balance Area for deuterium (Other)** **Default Controls:** **Task Specific Info:** Annual inventory required	**Negligible (0-20)**

E. Biological Hazards, Tasks and Controls
None

F. Offsite Work Hazards, Tasks and Controls
None

G. Other Issues (Security, Notifications to Other Organizations, Community Involvement, etc.)
None

H. Recommended Exposure Monitoring

- None

Description or comments:

I. EPHA Determination

Chemical Name	Quantity (lbs, gal)	Location (Bldg/Room#)

IV. Perform Work Within Controls

A. Recommended Training and Medical Surveillance Summary

- Laboratory Standard (HP-IND-220)
- Hazardous Waste Generator (HP-RCRIGEN3)
- Compressed Gas Safety (TQ-COMPGAS1)

B. Personnel Training, Qualification, and Authorization List

Employee/Guest Name	Life/Guest#	Dept	Required Training Course(s)	Signed
Abdul Rumaiz	23853	PS	Compressed Gas Safety (TQ-COMPGAS1) [EXPIRES: 3/4/2013] Laboratory Standard (HP-IND-220) [EXPIRES: 12/1/2013] Hazardous Waste Generator (HP-RCRIGEN3) [EXPIRES: 9/14/2012]	5/22/2012 2:32:29 PM
D. Peter Siddons	17705	PS	Compressed Gas Safety (TQ-COMPGAS1) [EXPIRES: 7/24/2015] Laboratory Standard (HP-IND-220) [EXPIRES: 8/6/2014] Hazardous Waste Generator (HP-RCRIGEN3) [EXPIRES: 12/6/2012]	

C. Emergency Procedures

There is a high pressure relief valve. All the electrical equipment is interlocked with the pressure sensors. There is an emergency shut off valve for the oxygen. Two exit signs are clearly marked in the clean room. For building emergencies, follow the NSLS Local Emergency plan

D. Transportation

N/A

E. Logistical Interactions

N/A

F. Termination/Decommissioning

All small chemicals generated are store in containers with secondary containments. In the event of the termination of the experiment the excess chemicals will be returned back to instrumentation department. All chemicals will be transferred and/or disposed. Equipment will be excesses or transferred when no longer needed.

V. Provide Feedback

None

VI. Attachments

See LS-ESH-0056 for special NSLS requirements on working with HF

Attached Files:

RE_ ESR 535 C-12 Acceptance Rumaiz.pdf