The only official copy of this file is the one online at https://fsd84.bis.bnl.gov/ESR/

Date Printed: Apr 18, 2012

Experiment Safety Review Form
Review Number: PS-ESR-1-159-Nov2011

PRINCIPAL INVESTIGATOR: Kaumudi Pandya
GROUP: X11A, X11B, X8C
EXT: 7734 **E-MAIL: pandya@bnl.gov** **LIFE NUMBER: P5232**

Project Title: Sample Preparation for EXAFS and TXM Experiments
Location(s): 0725
Area(s): 0725-FIRST-1-159
Proposed Start Date and Duration: 11/14/2011 - 1 years

SIGNATURES:

Principal Investigator: Kaumudi Pandya	**Date: 11/22/2011**
Experiment Review Coordinator: Lori Stiegler	**Date: 11/23/2011**
Co-PI or Alternate Contact (s): Chen, Yu Chen	**Date:**
Reviewer: Christopher Weilandics	**Date: 11/10/2011**
Reviewer: Frank Zafonte	**Date: 11/10/2011**
Reviewer: Lori Stiegler	**Date: 11/22/2011**
Reviewer: Deborah Bauer	**Date: 11/14/2011**
Reviewer: Brian Heneveld	**Date: 11/10/2011**
Approval: Lori Stiegler	**Date: 11/23/2011**
Review/Approval (ERC) Comments: 11/23/2011 9:01 AM	
Walkthrough Signature:	**Date:**
Expiration Date (max 1 yr.): 11/23/2012	
FUA Change Required? No	
Fire Rescue Run Card Changes Required? No	
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

Preparation of Samples for EXAFS Measurements

Solid materials (generally non-toxic) are weighed, ground, sieved, and spread on kapton tape.

Powders are mixed with boron nitride and pressed into sample holders. The press is a hand operated mechanical unit. Many users prefer to use the mechanical press available in room 1-160 (Beamline X10 Exxon Lab). Gloves, and safety goggles are available and the users are advised to use these as needed.

Assembly of Electrochemical cells

Dilute acids are dropped into small electrochemical cells with samples and sealed.

Assembly of Catalysis Cells

Samples are mounted in the cells and pre-treated as required. Typical treatments include heating the sample under helium and hydrogen. Small cylinder of Hydrogen is used and the sample treatment is carried out in the hood. When these experiments are present, they will be described in more detail on a Safety Approval Form.

Preparation of solutions

Users may prepare small quantities of solutions using solvents, some of which may be carcinogens.

Apparatus assembly

Electronic assembly of beam line components using hand tools, and soldering.

Use of cryogen-filled detector

Filling of dewar by transfer line from portable dewar. As the dewar is high, we use a transfer line to fill the detector.

Glove box

A glove box is available for sample preparation and inerted with compressed argon. Two cylinders are secured in the lab.

Fe-55 Source

A Fe-55 source is stored in the cabinet and used for detector set-up.

For X8C:

A. Preparation of samples for transmission x-ray microscopy (TXM) measurement: Non-toxic solid samples with size about 20-100 microns are glued to TXM sample holder using epoxy under the optical microscope.

B. Characterization of samples for TXM measurement: Non-toxic solid samples with size about 20-100 microns are observed and imaged under the optical microscope.

C. Solution preparation and basic electrochemistry: Preparation/dilution of acids (limited to nitric, sulfuric and acetic acids only) which may be used for non-toxic sample (electrode of battery and capacitors) preparation.

D. General cleaning of sample, sample holder and glassware using small quantities of solvents (acetone, alcohols).

Equipment manuals or procedures that are controlled documents:

N/A

B. Human Performance Factors

The cryogen fill is high (approx. 6'). A step-stool and transfer line are used to prevent ergonomic strain and cryogen exposure.

The users routinely need to walk behind the hutches (X11A and X11B) to conduct safety checklist (X11A and X11B), set the gas flow for ion chambers (X11A) , adjust detuning for the monochromator (X11B line). This requires walking thru the narrow passage between X11 and X12. There are several obstruction in this path, including two large LN2 dewars which pose a threat for slipping. There is H2O condensation on these dewars and very frequently there are small puddles on the floor. March 2011 update: One LN2 dewar has been relocated to provide better access between the beamlines.

C. Waste Minimization/Pollution Prevention

Smallest required quantities are used. Most materials are non-hazardous.

The users are asked to return the samples to the home institutions. Gloves and paper towels that may have come in contact with hazardous materials are disposed of properly.

D. Materials Used /Waste Generated

Materials Used	Disposal Method	Amount per Use	Amount per Year	Comments
Solvents (alcohols, acetone)	Fugitive	1.00 ml	50.00 ml	
Inert compressed gases	Fugitive	0.00 ft3	100.00 ft3	
Disposable gloves, wipes	Hazardous	1.00 ft3	10.00 ft3	Disposed in trash if no contact with hazardous chemicals
Hydrogen gas	Fugitive	0.00 ft3	20.00 ft3	
Dilute acids, including perchloric	Hazardous	50.00 ml	1.00 ltr	
Non-medical sharps	Medical	0.00 lb	0.50 lb	Not actually medical waste, but managed through the Medical Dept.
Chloroform	Hazardous	50.00 ml	500.00 ml	Carcinogen
Cobalt nitrate	Hazardous	5.00 g	0.00 g	
Bound/fixed nanomaterials	Other	0.00 g	0.00 g	May be stored in lab - no sample prep with nanomaterials
Toluene	Fugitive	10.00 ml	10.00 ml	Reproductive hazard

II. Identify and Analyze Hazards Associated with the Work

The following hazards were identified:

Physical Hazards:

- Sharps (non medical)
- Cryogens (any substance or device capable of producing temperatures <= 170K) (Areas: 0725-FIRST-1-159, 0725-FIRST-1-159)
- Compressed gases (lecture bottles, cylinders, gas lines) (Areas: 0725-FIRST-1-159, 0725-FIRST-1-159)
- Soldering of electronic components
- Compressed gas-Flammable (Areas: 0725-FIRST-1-159, 0725-FIRST-1-159)
- Flammable liquids (Areas: 0725-FIRST-1-159, 0725-FIRST-1-159)

Chemical Hazards:

- Chemicals, Hazardous (General)
- Carcinogens (Areas: 0725-FIRST-1-159, 0725-FIRST-1-159)
- Reproductive toxins (Area: 0725-FIRST-1-159)
- Corrosives
- Flammable liquids (Areas: 0725-FIRST-1-159, 0725-FIRST-1-159)

- Strong oxidizers
- Nano-material bound in a solid matrix or fixed substrate (Areas: 0725-FIRST-1-159, 0725-FIRST-1-159)
- Toxic metals (e.g., As, Ba, Be, Cd, Cr, Hg, Pb, Se, Ag) (Areas: 0725-FIRST-1-159, 0725-FIRST-1-159)

Ionizing and Non-ionizing Radiation Hazards:

- Sealed radioactive sources (SRS) –not accountable

Biological Hazards:

- None

Offsite Work:

- None

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

- None

Significant Environmental Aspects

- Any amount of hazardous waste generation (Area: 0725-FIRST-1-159)

III. Develop and Implement Hazard Controls and Assess Risk

A. Physical Hazards, Tasks and Controls

Hazard, Default Controls, Task Specific Info	Risk Level
Hazard: **Sharps (non medical)** **Default Controls:** Sharps including needles, razor blades and syringes (plastic and glass) must be disposed of in sturdy, rigid, sharps containers. Sharps containers cannot be more than 2/3 full. **Task Specific Info:** Wear gloves when possible to prevent cuts	**Negligible (0-20)**
Hazard: **Cryogens (any substance or device capable of producing temperatures <= 170K)** **Default Controls:** General Requirements: • Evaluate location oxygen deficiency • Store/transport only in approved containers (i.e. DOT/ASME or BNL LESHC) • Never pour from above chest level • PPE: Long Sleeve Shirt (or Lab Coat), long pants (or skirt covering ankles) and closed shoes Pressurized transfer to open (vented) container; Or-Pouring > 5 liter volumes of LN2 between open containers: • Face shield along with either Safety Glasses (w/side shields) or Goggles • Gloves (Cryo or Heavy Leather) Pouring small (5 liters or less) volumes of LN2 between open containers: • Safety Goggles (face shield recommended if possible) • Gloves (Cryo or Heavy Leather) Work with samples immersed in LN2 in small (~1 liter) dewars: • Use Tongs (tools) to manipulate/handle cryogenic samples (do not touch with gloves)• Use insulated non-absorbent gloves with dexterity (cotton/nylon gloves under disposable nitrile gloves) • Safety Goggles	**Negligible (0-20)**
Hazard: **Compressed gases (lecture bottles, cylinders, gas lines)**	**Negligible (0-20)**

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	
Hazard: **Soldering of electronic components** **Default Controls:** Engineering Controls • Substitute non-lead solder when applicable to components. • Designate area (eg metal tray, or disposable liner). • Minimum PPE: Safety glasses	**Negligible (0-20)**
Hazard: **Compressed gas-Flammable** **Default Controls:** In addition to compressed gas requirements: • Flash arrestor/backflow device • Separate 20 ft from oxidizers or barrier • Electrically ground lines/equipment • Non-Sparking tools	**Negligible (0-20)**
Hazard: **Flammable liquids** **Default Controls:** As for chemicals, plus Store large quantities in Flam. cabinets as required	**Negligible (0-20)**

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. **Task Specific Info:** Lab coat required when working with chemicals. Put chain with lab coat sign across door entrance when working with chemicals. No glass containers > 1L.	**Negligible (0-20)**
Hazard: **Carcinogens** **Default Controls:** Use hazardous chemicals controls plus: Establish and post a "designated area" where used Note location on fire run card and hazard info. placard. Exposure monitoring to assure that action levels not exceeded	**Negligible (0-20)**

Establish procedures for work area cleanup and decontamination

Task Specific Info:

Decontaminate area by wet wiping, and de-post when work is complete

Hazard: **Reproductive toxins** — **Negligible (0-20)**

Default Controls:
Use hazardous chemicals controls plus:
Establish and post a "designated area" where used
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
Exposure monitoring, determined by SHSD Rep, to assure that action levels not exceeded
Prior to decommissioning, establish procedures for sampling and decontamination

Task Specific Info:

Decontaminate area by wet wiping, and de-post when work is complete

Hazard: **Corrosives** — **Negligible (0-20)**

Default Controls:
Use hazardous chemicals controls plus:
- Unobstructed access to Emergency Eyewash and Shower

Task Specific Info:

Keep door open when using corrosives for access to emergency eye wash and shower.

Hazard: **Flammable liquids** — **Negligible (0-20)**

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

Hazard: **Strong oxidizers** — **Negligible (0-20)**

Default Controls:
Use hazardous chemicals controls.
Review large quantity storage with Fire Protection Engineer

Task Specific Info:

Store nitric acid in separate secondary containment.

Hazard: **Nano-material bound in a solid matrix or fixed substrate** — **Negligible (0-20)**

Default Controls:
PPE Requirements for Handling: Standard PPE required for the work area. No additional requirements.
Handling Requirements
• No Mechanical abrasion.
• No thermal stresses.
• No etching
Laboratory Posting Requirements - No Posting Requirements
Waste Handling:
• Solids containing nanomaterials which have a potential to be released must NOT be disposed in the regular trash. See SBMS Hazardous Waste Management for more information.

• Collect solid UNP waste in a bag (6 mil thick minimum zip-lock type or J-sealed) or other sealing container (i.e. jar with threaded lid). • Spell out the chemical name (do not use formulas or trade names) on the RED Hazardous Waste Label. • The contents line on the label must contain the chemical composition and the word “NANO” • A second label, in addition to the Red Hazardous Waste Label, is required on the outside other container/bag stating “CONTAINS NANOMATERIALS” see ES&H Coor. or 90-Day area manager for labels.	
Hazard: **Toxic metals (e.g., As, Ba, Be, Cd, Cr, Hg, Pb, Se, Ag)** **Default Controls:** As for chemicals, plus need for SHSD and OMC monitoring and surveillance must be evaluated BURF for Beryllium operation	**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 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”.	**Negligible (0-20)**

D. Radiation Hazards, Tasks and Controls

Hazard, Default Controls, Task Specific Info	Risk Level
Hazard: **Sealed radioactive sources (SRS) –not accountable** **Default Controls:** bring up accountable table in Subject Area) Contact FSS to discuss specific controls which may include: Engineering Controls: • Physical areas boundary • Shielding • Inventoried sources must be stored securely (locked) when not in use. Administrative Controls: • Inventory checks and leak tests • Registration and source Id labels. • Updates to Department and Master Custodians, using SRS Data Forms. • Rad Area Postings, and Rad Material labelling	**Negligible (0-20)**

• Radiological Work Permit. • All radioactive materials brought on-site or taken off-site must go through I&SM. Training: • Rad Worker I (HP-RWT-002), or GERT. Dosimeter/Monitoring: • TLD, ring dosimetry • RCT monitoring/job coverage	

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

- NSLS R2A2 for Lab Stewards (LS-R2A2-LAB-STWD)
- NSLS R2A2 for Deputy Lab Stewards (LS-R2A2-LAB-STWD-DEP)
- Laboratory Standard (HP-IND-220)
- Cryogen Safety (HP-OSH-025)
- 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
Kaumudi Pandya	P5232	LU	Cryogen Safety (HP-OSH-025) [EXPIRES: NEVER] Compressed Gas Safety (TQ-COMPGAS1) [EXPIRES: 1/14/2013] Laboratory Standard (HP-IND-220) [EXPIRES: 7/25/2013] Hazardous Waste Generator (HP-RCRIGEN3) [EXPIRES: 3/21/2013] NSLS R2A2 for Lab Stewards (LS-R2A2-LAB-STWD) [EXPIRES: 9/7/2012]	11/22/2011 12:00:00 AM
Barry Karlin	K6790	LU	Cryogen Safety (HP-OSH-025) [EXPIRES: NEVER] Compressed Gas Safety (TQ-COMPGAS1) [EXPIRES: 5/27/2012] Laboratory Standard (HP-IND-220) [EXPIRES: 6/23/2013]	12/28/2011 12:00:00 AM
Yu Chen Chen	24919	PS	Laboratory Standard (HP-IND-220) [EXPIRES: 6/6/2013] Hazardous Waste Generator (HP-RCRIGEN3) [EXPIRES: 6/19/2012] NSLS R2A2 for Deputy Lab Stewards (LS-R2A2-LAB-STWD-DEP) [EXPIRES: 11/14/2012]	11/23/2011 9:45:22 AM

C. Emergency Procedures
Spill kit is located outside Room 1-165. Contact the Control Room for any spill or emergencies. Follow Bldg 725 Local Emergency Plan.

D. Transportation
None

E. Logistical Interactions
None

F. Termination/Decommissioning

All chemicals and equipment will be transferred or dispositioned upon completion of work.

V. Provide Feedback

LN2 dewar from X12 was re-located to aid in access to upstream part of beamline X11.

VI. Attachments

Attached Files: