Safe Working Practices for SNL/NM Center 1100

Part A: PHS Information

PHS Identification
PHS-SNL07A00125-006 CINT Rms: 1524, 1525 & 1526 - Metal Deposition Lab; PHS-SNL06A00448-008 CINT (clean room, all labs) - Integration Lab

Hazard Classification: Low
NEPA SNA07-0202 - CINT Integration Laboratories (1501, 1504, 1523, 1525, and 1527)

Laboratory Owner
John Nogan, 1132, 284-8863

Brief Description of R&D Work Performed in this Laboratory
Room 1525 and chase 1526 bay contains multiple vacuum deposition systems (base pressure 10^-7 torr) for the deposition of high purity materials typically used in lift-off and subtractive etching processes. Additionally, the sputter deposition tool can be configured for conformal deposition of many types of metals, dielectrics and ternary compounds.

The chemical benches will be used for standard processing of devices fabricated on Si wafers. Typical processes will include removal of photoresist and degreasing using solvents, wet chemical etching of metals, Si, and SiO2 and other standard processes.

The rapid thermal annealer (RTA) uses a set of bulbs to rapidly heat silicon wafers to temperatures in excess of 1000C in an inert environment, such as N2. Additionally, forming gas (4% H2/ balance nitrogen) can be used to prevent oxide formation during annealing.

Part B: Operations Identification, Hazards and Mitigation

Short Title of Laboratory Operations Category: Chemical Usage
Rigor Level: Medium

Description of Laboratory-Specific Operations that Involves Chemical Hazards:
Acids: Hydrofluoric, hydrochloric, sulfuric, acetic, nitric and orthophosphoric
Bases: Tetramethylammonium hydroxide, potassium hydroxide, ammonium hydroxide and ammonium sulfide.
Solvents: Organic solvents such as isopropanol, methanol, acetone and N-Methyl-2-pyrrolidone are used.

The solvent bench is a locally ventilated hood with a solvent collection system. Air discharges are small and consistent with typical R&D operations. The potential for exposure to solvent vapors is low based on the small quantities used and the use of local exhaust ventilation. Handling of Acid/Base process chemistries that exhibit a particularly above average risk are clearly outlined in "Chemical Processing Guides". These Chemical Processing Guides can be found in the Acid/Base Wet Bench Tool Specific Notebook.

Baseline Occupational Exposure Assessments were completed and are listed below:
ER2007-2630 - Baseline OEA (518/1525) CINT Rm: 1525 – Metal Deposition Lab

Exposure Assessment Survey Report SNLNM02759

Conclusions stated that exposure controls are adequate for laboratory operations.
All activities that involve chemicals will follow the laboratory practices outlined in SNL/NM Center SOP1100.00 Standard Operating Procedure for Working with Hazardous and Particularly Hazardous Chemicals in Center 1100 Laboratories.

Applicable Technical Work Documents:	**Required Training:**
• SOP1100.001 Standard Operating Procedure for Working with Hazardous and Particularly Hazardous Chemicals in SNL/NM Center 1100 Laboratories **These documents are required reading for all authorized workers.**	• ESH100 ES&H Awareness • CHM100 Chemical Safety Training • CHM103 Site-Specific Chemical Safety Training • ENV112 Hazardous Waste and Environmental Management • ILUA Integrated Lab Unescorted Assess Training **These courses are required training for all authorized workers.**
Possible Chemical Hazards: • Adverse reaction from contact with incompatible materials. • Fire due to exposure to an ignition source. • Bodily Injury due to absorption, injection, ingestion or inhalation of a toxic substance. • Refer to the Material Safety Datasheets for more detailed information on material specific hazards.	**Mitigation of Chemical Hazards:** Solvents are stored in an approved flammable cabinet. Other hazardous liquids are stored in the appropriate manner per SOP1100.001. A minimum of latex gloves and safety glasses are worn while handling hazardous liquids to mitigate incidental contact and are handled in the fume hood. Calcium gluconate is available in the event of a dermal exposure to hydrofluoric acid. To mitigate incidental contact, all chemicals are handled with basic PPE (latex gloves and safety glasses) and always in a fume hood. Additional PPE (specific chemical resistant gloves, lab coat and safety goggles) is utilized based on the chemical hazard as per the chemical MSDS and SOP1100.001. All hazardous waste is disposed of in accordance with SOP1100.001.

Short Title of Laboratory Operations Category: Environmental **Rigor Level: Low**	
Description of Laboratory Operations Category: Solid as well as liquid hazardous waste is generated during operation processes.	
Applicable Technical Work Documents: • SOP1100.001 Standard Operating Procedure for Working with Hazardous and Particularly Hazardous Chemicals in SNL/NM Center 1100 Laboratories **These documents are required reading for all authorized workers.**	**Required Training:** • CHM100 Chemical Safety Training • CHM103 Site-Specific Chemical Safety Training • ENV112 Hazardous Waste and Environmental Management. • ILUA100 Integrated Lab Unescorted Assess Training **These courses are required training for all authorized workers.**
Resulting Hazards: • Environmental concerns if organic solvent should enter the wastewater treatment system. • Solid solvent waste placed in landfill could leach and enter the environment. • Dumpster fire, toxic fumes entering the environment.	**Mitigation of Identified Hazards:** Solvent contaminated wipes, swabs, and gloves will be disposed of in the trash receptacles marked Solvent. Dried wipes of evaporated acetone, isopropanol, or methanol may be disposed of in the non-hazardous trash.

Short Title of Laboratory Operations Category: Mechanical hazards **Rigor Level: Low**	
Description of Laboratory Operations Category: Portable power tools are used occasionally during operations.	
Applicable Technical Work Documents: • N/A **These documents are required reading for all authorized workers.**	**Required Training:** • ESH100 ES&H Awareness • ILUA Integrated Lab Unescorted Assess Training **These courses are required training for all authorized workers.**
Resulting Hazards: • Bodily injury which could include, sprains, cuts and scrapes. • Eye Injury possible if ANSI approved safety glasses are not worn during this activity.	**Mitigation of Identified Hazards:** On-the-Job training is conducted when appropriate by authorized laboratory personnel.

Continuous Improvement and Feedback

This SWP document must be reviewed, revised (if necessary), and re-signed at least annually in conjunction with PHS renewal. This SWP must be revised earlier in response to:

- new hazards (e.g. chemicals) being introduced in to the laboratory,
- recognition of hazards not previously considered, or
- identification of significant improvements to hazard control/mitigation defined in this document,

and other situations where improvement to laboratory safety should be documented. It should be noted that these same conditions may require revision of the laboratory PHS and required training matrix.

Reviews and Approval

Prepared by Laboratory Owner

John Nogan	John Nogan	8/29/12
Printed Name	Signature	Date

Reviewed by CINT ES&H Coordinator

Bob Burkhart	RABurkhart	8/29/12
Printed Name	Signature	Date

rab Center ES&H Coordinator initials here designate that further review by Industrial Hygiene or other Subject Matter Experts is not required.

Reviewed by Center Industrial Hygienist as required

Printed Name	Signature	Date

Additional SME Review required by Center ES&H Coordinator or Department Manager

Reviewer	Title/Activity	Signature	Date

Approved by Department Manager

By approving the SWP, the Department Manager attests that it is an appropriate assessment of the ES&H risks associated with the R&D activities that are authorized to take place in the designated lab(s). The approval signature further indicates that the hazard mitigations specified in this SWP are also appropriate.

Sean Hearne		8/29/12
Printed Name	Signature	Date

Laboratory Authorization Sheet:

Signature by the Authorized Workers in the following Summary Authorization Table certify that the worker has read, understood, and agree to follow the Safe Working Practices identified in this document. Authorized Workers agree that they will not introduce hazards into this laboratory that are not covered by the PHS, SWP, and related documents."

If a new MOW is brought in to work in the laboratory, their training must be evaluated by the Manager or Lab Owner prior to any work being assigned or conducted. Their signature asserts that this has been done.

Printed Name	Signature	Date	Lab Owner Confirm. (initials)	Chemical Operations	Environmental	Mechanical Hazards								
Rigor Level				*M*	*L*	*L*								