

SCHOOL OF MEDICAL SCIENCES

General Risk Assessment – Within labs or offices

Department: Physiology and Pharmacology	Room number: LG04	Date assessed: 11 March, 2004
Procedure title: Making patch-clamp microelectrodes	Assessed by: Trevor Lewis	Supervisors signature:

Description of Procedure:

The preparation of glass capillaries and the subsequent use of those capillaries for the manufacture of patch-clamp electrophysiology electrodes. This includes the cutting of the glass, polishing of the ends, rinsing in ethanol, manufacture of the electrode on a horizontal puller, applying Sylgard and the heat polishing of the electrode tip.

Apparatus/Equipment used:

Borosilicate glass capillaries (1.5mm outside diameter); diamond tipped glass cutter; LP gas burner; Sutter P80 horizontal (Flame-Browning) style puller; electric heating coil to cure Sylgard; microforge for polishing electrode tips with platinum heating filament.

Chemical Hazards – Properties of chemicals to be used

Hazardous substance	Hazards (see label and MSDS) Indicate if relevant								
Reactants or Products	Flammable	Corrosive	Toxic	Harmful	Irritant	Oxidizing	Radioactive	Safe	MSDS viewed
LP gas	Yes								Yes
Sylgard 184 base								Yes	Yes
Sylgard 184 curing agent								Yes	Yes
95% Ethanol	Yes		Yes	Yes	Yes				Yes

First Aid Notes:

For ethanol:

Eye Flush gently with running water. Seek medical attention if irritation develops.

Inhalation If over exposure occurs leave exposure area immediately. If other than minor symptoms are displayed seek immediate medical attention.

Skin Gently flush affected areas with water. Seek medical attention if irritation develops.

Review of Hazard/Risk

Step in process List major steps or tasks in process	Hazard	Risk (Harm)	EXISTING CONTROLS List all current controls that are already in place or that will be used to undertake the task e.g. -personal protective equipment - identify facility type, location - existing safety measures	Risk rating with existing controls?			ADDITIONAL CONTROLS REQUIRED Additional controls may be required to reduce the risk rating e.g. - greater containment - specific induction / training - additional personal protective equipment	Risk rating with additional controls?		
				Consequences	Likelihood	Rating		Consequences	Likelihood	Rating
1. Cutting glass capillaries to correct length by scoring with a diamond knife then breaking 2. Heat polishing the cut ends of the glass capillaries 3. Rinsing glass in 95% ethanol 4. Pulling glass into pipettes	Glass splinters from breaking scored glass	Minor cuts or glass splinters flying	<ul style="list-style-type: none"> Eye protection must be worn. Care must be taken in cleaning up area used to cut the glass. 	2	D	L	<ul style="list-style-type: none"> Once all current stocks of glass capillaries are used, all new orders will be for capillaries pre-cut to length. 	1	E	L
	LP gas burner	Burns from heated glass or directly from the flame	<ul style="list-style-type: none"> PPE must be worn, including eye protection and hair must be tied back. Training of lab personnel such that only one end of the glass is heat polished at a time and allowed to cool before doing the other end. Must be done away from flammable solvents. 	2	D	L				
	Splashes or spills	Potential irritation to skin or irritation / damage to eyes	<ul style="list-style-type: none"> Good laboratory practice and wearing of PPE 	2	D	L				
	Electrical	Electric shock	<ul style="list-style-type: none"> Yearly inspection and testing of power cord and equipment (inspection tags attached). 	2	E	L				
	Hot equipment	Burns	<ul style="list-style-type: none"> The heating of the glass and the pulling of the pipettes occurs behind an acrylic shield that is lowered into position before starting the process. There may be residual heat in the brass blocks that hold the platinum ribbon filament, but the fabricated pipettes are held on separate parts of the puller such that there is not need to 	2	E	L				

Step in process List major steps or tasks in process	Hazard	Risk (Harm)	EXISTING CONTROLS List all current controls that are already in place or that will be used to undertake the task e.g. -personal protective equipment - identify facility type, location - existing safety measures	Risk rating with existing controls?			ADDITIONAL CONTROLS REQUIRED Additional controls may be required to reduce the risk rating e.g. - greater containment - specific induction / training - additional personal protective equipment	Risk rating with additional controls?		
				Consequences	Likelihood	Rating		Consequences	Likelihood	Rating
4. Pulling glass into pipettes (cont.) 5. Coating with Sylgard 184 silicone elastomer and curing by heating	Sharp pipette tips	Stick injuries	go near the heating block.	2	D	L				
	Electrical	Electric shock	<ul style="list-style-type: none"> Careful handling of pipettes with forceps Yearly inspection and testing of power cord and equipment (inspection tags attached). Training of personnel 	2	E	L				
	Hot heating coil	Burns		2	D	L				
6. Heat polishing of pipette tips	Hot equipment	Burns	<ul style="list-style-type: none"> The filament is only turned on for short periods of time (1-2 s) when the operators hands are away from the filament 	2	E	L				
7. Transport and storage of pipettes	Sharp pipette tips	Stick injuries	<ul style="list-style-type: none"> Pipettes are carefully handled individually or with forceps. Pipettes are secured on strips of blue-tak in petri dishes for transport and storage to minimize risk of expose to sharp tips 	2	D	L				

<u>Containment Facility used</u>	<u>Sterilization/Decontamination requirements</u>	<u>Disinfectant</u>	<u>Location of Spill Kit</u>	<u>Emergency information</u>
Location: LG04 PC level: PC1	N/A	Type: N/A Suitability:	Room: LG04 near the storage cabinet for corrosives	Contacts: Prof Peter Barry Dr Trevor Lewis Dr Andrew Moorhouse

Physical Hazards

- | | | | | |
|--|---|--|---|--|
| <input type="checkbox"/> Explosion | <input type="checkbox"/> Hot liquids | <input checked="" type="checkbox"/> Spillage/Splash | <input type="checkbox"/> Chemical fumes | <input checked="" type="checkbox"/> Fire |
| <input type="checkbox"/> Heavy objects | <input type="checkbox"/> Cold liquids | <input checked="" type="checkbox"/> Sharps | <input checked="" type="checkbox"/> Hot equipment | <input type="checkbox"/> Other people |
| <input type="checkbox"/> Radiation | <input type="checkbox"/> Cold environment | <input checked="" type="checkbox"/> Ignition source | <input type="checkbox"/> Biological | <input type="checkbox"/> Other |
| <input type="checkbox"/> Pressure/vacuum | <input type="checkbox"/> Noise | <input checked="" type="checkbox"/> Electrical current | <input type="checkbox"/> UV/X-Ray/laser | |

Comments:

Cut glass capillaries have sharp ends before they are polished. The LP gas burner used to polish the cut capillaries is an ignition source and a fire hazard. Spillage or splashing of ethanol used to wash the glass capillaries. Pulled glass electrodes have fine, sharp tips that can be a sharps stick hazard. The heating coil used to cure the Sylgard 184 is hot, as is the microforge filament. The horizontal puller, heating coil and microforge are all electrical equipment and a potential electrical current hazard.

Control Measures Needed

- | | | | |
|--|--|---|---------------------------------------|
| <input checked="" type="checkbox"/> Protective clothing | <input type="checkbox"/> Fume cupboard | <input type="checkbox"/> Hearing protection | <input type="checkbox"/> PC1 lab |
| <input checked="" type="checkbox"/> Appropriate eye protection | <input checked="" type="checkbox"/> Appropriate footwear | <input type="checkbox"/> Handling aids | <input type="checkbox"/> PC2 lab |
| <input type="checkbox"/> Gloves | <input type="checkbox"/> Appropriate face mask | <input checked="" type="checkbox"/> training received | <input type="checkbox"/> Hot room |
| <input type="checkbox"/> Nitrile gloves | <input type="checkbox"/> Remove ignition source | <input type="checkbox"/> Assistance needed | <input type="checkbox"/> S.O.P viewed |

Comments:

Standard personal protective equipment should be worn. Eye protection must be worn when cutting glass. Hair must be tied back when using the LP gas burner, when using the heating coil for curing the Sylgard and when using the microforge to polish pipette tips. All personnel should receive training on how to use the Sutter P80 horizontal pipette puller.

Other Control Measures

Location of nearest Spill Kit: LG04 near corrosives cabinet

Location of nearest Eye Wash: First Aid Kit, LG04

Location of nearest First Aid Kit: LG04 near corrosives cabinet

Nearest Safety Shower: Not available

Clean up and disposal of contaminated waste

- | | | |
|---|---|---|
| <input type="checkbox"/> Non halogenated hydrocarbons | <input type="checkbox"/> Gloves | <input type="checkbox"/> Other (please specify) |
| <input type="checkbox"/> Halogenated hydrocarbons | <input type="checkbox"/> Biological | <input type="checkbox"/> Radioactive |
| <input type="checkbox"/> Aqueous (not heavy metal) | <input checked="" type="checkbox"/> Sharps | |
| <input type="checkbox"/> Aqueous heavy metals | <input checked="" type="checkbox"/> Glass bin | |

Clean up procedure:

Any broken glass capillaries should be carefully swept up and placed in the glass bin. Fabricated pipettes that are used or broken should be placed in the sharps bin.

Overall Risk Assessment:

- Low risk (simple assessment). File and keep this assessment.
- Risks are significant but can be effectively controlled. File and keep this assessment.
- Risks are significant and not easily controlled. Carry out a more detailed risk assessment and report. File and keep. Consider other control measures and provide training.

Signed:

Date: 11 Mar 04

Date for review: 11 Mar 05