## GENERAL PROCESS AND OPERATION SPECIFICATION

#### Clustex

### I. SCOPE

a. The purpose of this document is to describe requirements and basic operating instructions for the Clustex tool. This deposition tool is intended for up to 4" substrates and can be deposited on by up to three magnetron sputtering heads.

#### II. SAFETY

- a. Be sure that you are trained and signed off to use this equipment per AggieFab policy.
- b. Refer to Safety Features in Clustex Operating Instructions manual.
- c. Operating personnel need to be aware of the hazards that they may be exposed to while operating the tool.
  - i. Electrical Hazards: high voltages can exist at the tool, power rack, pumps and other areas.
  - ii. Toxic Substance Hazards: wafers may be coated with toxic materials. Exercise caution when handling processed materials.
  - iii. Process Gases: Nitrogen, Argon, and Oxygen.
  - iv. Strong Magnetic Fields: Magnetrons can cause disruptions in pacemakers and other electrical implants.
- d. If you are unsure about any procedure or indication while operating this equipment, contact a staff member or trainer for assistance.

### III. APPLICABLE DOCUMENTS, MATERIALS AND REQUIREMENTS

- a. For more information about the detailed operation of this tool refer to the Clustex operation specification or electronic manual.
- b. Appendix A: Currently Installed Targets
- c. Appendix B: Recipe Creation and Editing
- d. Appendix C: Home Screen Monitor

#### IV. OPERATION

- **a.** Log into your account:
  - i. Click "User" on the top left of the window
  - **ii.** Select your account and type in your password
- **b.** Select the "Overview" tab to ensure there are no active alarms
  - **i.** Active alarms will be colored red. Noticeable places to check are: three pumps, water flow for magnetrons, and the detail window.
- **c.** Create/edit your recipe
  - i. Select the "Recipe" tab
  - **ii.** To create a new recipe:
    - 1. Select the "Category" to store your recipe in
    - 2. Click the "new" button under "Recipes"
    - **3.** Use previous recipes as macros to simplify the recipe and copy steps from existing recipes to keep the same format.
    - 4. The general process should be process start  $\rightarrow$  plasma start  $\rightarrow$  substrate movement  $\rightarrow$  plasma finish  $\rightarrow$  process end

- **iii.** To edit an existing recipe (NOTE: Do not edit pre-existing recipes unless it is your own.):
  - 1. Select "Category" and "Recipe" you want to edit.
  - 2. Select the step you wish to edit
  - **3.** Click the "toolbox" button above the list of recipe steps
  - **4.** To review your entire recipe, select the "tree view" option above the list of steps. This will show you every step, even within the macros you use.
- **iv.** NOTE: The software does NOT verify the logic of a recipe. An improper recipe can still be saved and run.
- **v.** Save the recipe you created/edited
- **d.** Run your recipe
  - i. Under "Recipe" at the bottom of the window, select "On"
  - ii. Choose the Category and Recipe you want to run
  - iii. Click "Ok"
  - iv. Ensure the "Reflected Power" is ~0 W and the "Bias Voltage" > 5V on the "Process" screen
  - **v.** To view the steps of the recipe being run:
    - **1.** Select "Tools" in the upper left of the window
    - 2. Click Layers and a window of the recipe will appear
  - vi. If an error or warning appears, the recipe will be put on "Break"
    - **1.** Press "Error Reset" to acknowledge the warning
    - **2.** Press "On" under Recipe at the bottom of the window to continue the recipe after the error has been solved. If error cannot be solved, stop the recipe and attempt to fix the issue within the recipe.
  - vii. The recipe name and step will be displayed in the top right of the screen. When completed this will display "Recipe Completed"
- **e.** Logout when finished with the tool:
  - **i.** Click "User" in the menu bar
  - ii. Select "Change User"
  - iii. Choose "logout" as the user and enter "logout" for the password

# V. SIGNATURES AND REVISION HISTORY

- a. Author of this document: Mitchell Roselius
- b. Author Title or Role: Student Technician
- c. Date: 24 October 2019
- d. Revision: A

# Approvals:

Technical Manager Signature:

Date: \_\_\_\_\_

Revision History:

Revision	Author	Date
Original Issue	Mitchell Roselius	24 October 2019
Rev A		
Rev B		
Rev C		
Rev D		
Rev E		

Magnetron #	Generator	Target Mat'l	Date Installed/changed	# of Spares	Cost from Lesker 2" dia, 0.125"
1	1RF	N/A - Ion Etch	^04/15		
2	1RF	SiO2	2/14/2017		\$97
3	1RF	W	1/15/2016		\$209
4	1RF	VO2	6/18/2016		RFQ
5	1RF	Nb2O5	11/29/2015	1	\$228
6	2RF	Si	7/29/2015	1 (new)	\$169
7	2RF	TiN?	3/6/2015	1 (new)	\$506
8	2RF	Al2O3	7/29/2015		\$424
9	2RF	lr	9/15/2016		Price on Request
10	2RF	NbO2	No date entered	1	\$228
11	3RF	HfO2	2/29/15		\$646
12	3RF	Ta2O5	2/8/2015		\$451
13	3RF	TiO2	6/27/2016		\$382
14	3RF	Ru	11/20/2015		Price on Request
15	3RF	Zr	4/29/2016		\$94
16	3RF	Hf	No date entered	1	\$373
17	4DC	Ti	9/12/2016		\$85
18	4DC	Та	? 2016		\$218
19	4DC	Pt	4/29/2016		Price on Request
20	1RF	Cr	7/29/2015		\$138

# **Appendix A – Currently Installed Targets**

# **Appendix B – Recipe Creation and Editing**

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₹.	Goto Transfer, Setpoint(WORD) = 0		PLAD01_POS			-	0.0.0.0.0	0.0.0.0.0.0.0.0.0
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$T_{\hat{I}}$	Substrate table variable hight Upper transfer, Setpoint(SINGLE) = 0.00 mm	Substrate table variable hight	SYM MAH01_POE	SYM	PLAH01_POS	0	32.6117.611	4 1704 0 0 4 0 0 0 0 0 0 0 0
				-			8H0061 Option	0.0.0.0.0.0.0.0.0.0
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*	Chamber Lamp 045	Chamber Lamp	SYM P1LMP01	SYM	P1LMP01	0	8H0059 Option 2 : 617 : 614 : 0	0-0-0-2-0-0-0-0-0-0-0-0
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Þ	Moves a line in a recipe upward or downward	d.						
	Opens a user dialog for creating a rea	tipe. The sub-menus open						
	corresponding toolboxes:							
	<ul> <li>direct sequential control</li> </ul>							
	<ul> <li>date/time control</li> </ul>							

# **Appendix C – Home Screen Monitor**



Typical screen display

- 1 State field
- 2 Display of recipe status
- 3 Closing the visualization window
- 4 Visualization window
- 5 Detail window

- 6 main command bar
- 7 Date and time
- 8 Status bar
- 9 main menu bar
- 10 menu bar

Blue – Water flow for magnetrons

Yellow – Load lock roughing pump, process chamber cryo pump, process chamber turbo pump

Black – Pressure gauges for load lock and process chamber