





Assaf Hazzan Tel Aviv University Nano Technology Center Clean Room This machine has a touch screen make sure your hands are clean and that you don't have any solvents or other materials on your hands and gloves.

	SPUTTERING Sam	ple Insertion or Removal
1	Make sure the power supply is turned on. If not turn on by the power on switch.	T B1 Controller
2	 Make sure there are no active alarms. If all the water alarms are active then the water cooling chillier needs to be turned on. Examine each alarm and fix the problem if all looks as it should press the <i>ALARM RESET</i> button. 	 Target Milling Holder Sputter Holder Chamber Vacuum Ion Source IL Air Switch SQM Comm MPS Comm ALARM RESET
3 4	Log in at main menu On the main screen press the VENT button and wait until the chamber reaches atmospheric pressure.	



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5	Rotate the sample holder to the ACCESS position marked #1 (110 [°])	
6	Open chamber door	G 130 HAD
7	Rotate the sample holder to the <i>LOAD</i> position marked #2 (0°)	
8	Open the shutter by clicking on the screen.	
9	Place the sample on the sample holder and attach using fingers clamps or Kapton adhesive film.	
10	Close the shutter by clicking on the screen.	
11	Return the sample holder to ACCESS Position marked #1 (110°) Close the chamber door.	
12	Click the <i>HIGH VACUUM</i> button while holding the door closed with the other hand.	Chamber Vacuum HiGH VACUUM STANDBY VENT GAS LINE PUMP
13	Once the chamber is at vacuum (i.e. holding the door in place)), rotate the sample holder to the <i>SPUTTER</i> position marked #3(220 ²).	240 230 220 20 20 20 20 20 20 20 20 20 20 20 2



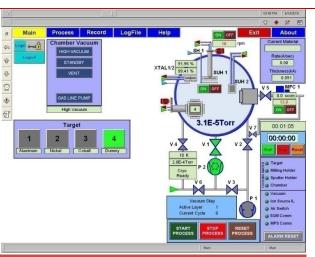


	SPUTTEI	RING Process Setup
1	Click the <i>Process</i> Tab	
2	Click the arrows under <i>Film Number</i> until it reaches the correct layer. Click the <i>LOAD Film</i> button	Accipe Load Image: Control of the co
4	Choose the Film suitable for your needs	With Construction The field of Construction With Computer The name Wy Computer Fiele name Process Fiele of Upose
5	(Make sure the targets for use with this process are installed in the machine)	
6	Make sure the loaded Film is the correct one.	
7	Check the process type label and make sure it is <i>SPUTTER</i> . If it is not: Press the <i>PROCCES TYPE</i> and change it to <i>SPUTTER</i> .	✓ Y28
8	Enter the desired film thickness in Angstroms in the <i>FINAL</i> <i>THICKNESS</i> field.	ZFACTOR 0.381 USCHARGE USCHARGE 40.0 ↓ TOOLING (h) 306 USCHARGE USCHARGE 38.0 ↓ BACKUP 306 USCHARGE USCHARGE 38.0 ↓ BACKUP 306 USCHARGE USCHARGE 10.0 ↓ Target 3 RUBERTALIZER USCHARGE 10.0 ↓ Target 3 RUBERTALIZER USCHARGE 10.0 ↓ CARGET Target 3 RUBERTALIZER USCHARGE (h) 300 ↓ CARGET Target 3 COLLEATOR USCHARGE (h) 300 VENDAR USCHARGE (h) 300 ↓ College (h) 13.0 VCCELEATOR USCHARGE (h) 120
9	If you wish to add layers to the process change the layer number by pressing the <i>arrows</i> under film number to the desired layer and repeat the procedure from paragraph 2.	
10	Update the number of layers in the NUMBER OF LAYERS field.	
11	When finished programming the process press the <i>WRITE</i> Button. Wait till the transfer data bar is filled. (failing to do so will run a previously inserted process)	Image: Save save size Image: Save save save save size Image: Save save save save save size Image: Save save save save save save save save s
12	Return to the main screen by clicking the <i>MAIN tab</i> .	Vacuum Step Active Layer 1 Current Cycle 0 START PROCESS PROCESS PROCESS





13	Click the START PROCESS button	Ø Main Process Record Ø Logn Jung Jung Jung Jung Jung Jung Jung Ju
14	The Login Dialog will open: fill in user name, password, group name and comments.	CAS LINE PUMP High Vacuum Target Auminum Nickel Cobalt
15	The film type and deposition step are indicated in the window above the " <i>START</i> , <i>STOP</i> , and <i>RESET PROCESS</i> " buttons.	
16	 Every film deposition program sequences through the following steps: 1. Vacuum step: Waits until the chamber reaches 5E-6 Torr 2. Gas stabilization: Stabilizes the gas flow (30sec). 3. Ion gun warm up: Heats the ion gun for the first layer (5 min) 4. Deposition: sputtering 5. Cool down: Ion gun cool down after process has finished (5 min) 6. Starts next layer, if defined. When process has finished the <i>VENT</i> option is available. 7. After venting the chamber, remove your sample and pump the chamber by clicking the <i>HIGH VACUUM</i> button on the main menu. 	







This machine has a touch screen make sure your hands are clean and that you don't have any solvents or other materials on your hands and gloves.

	Milling Sample Insertion				
1	Make sure the power supply is turned on. If not turn on by the power on switch	T B1 Controller C			
2	 Make sure there are there are no active alarms. If all the water alarms are active then the water cooling chillier needs to be turned on. Examine each alarm and fix the problem if all looks as it should press the <i>ALARM RESET</i> button. 	 Target Milling Holder Sputter Holder Chamber Vacuum Ion Source IL Air Switch SQM Comm MPS Comm ALARM RESET 			
34	Log in on the main screen Click the Vent button on the main screen and wait until the chamber reaches atmospheric pressure.	Nain Process Record LogPilo Heip Terminic Terminic Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image: State Public Image:			



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5	Rotate the sample holder to the <i>MILLING</i> position marked #4 (180 [°]).	
6	Open the chamber door.	
7	Click on target <i>number 4</i> on the main screen.	
8	Make sure target number 4	
	is a dummy target.	Target 1 2 3 4 Aluminum Nickel Cobatt Dummy
9	The milling sample holder is located in the inner part of the chamber as shown at the picture.	
10	Release the sample holder by releasing the locking nuts.	





11	Lower the sample holder into position by lowering the sample until it reaches the stopper.	
12	Retighten the locking nuts.	
13	Attach sample to sample holder using fingers clamps or Kapton adhesive tape.	
14	Close the chamber door.	are metal and a second logFile Help and area to a second logFile Help area
15	Click the <i>HIGH VACUUM</i> button while holding the door is closed with the other hand.	Control Material Control Mate





Milling Process Setup			
1	Click the Process tab	<u>?</u>	
2	Click the LOAD FILM button	Ø Main Process Record LogFile Help Exit About C:05caments and Simpuliarity Document/Process/MIIIIng V8T	
3	Choose the <i>MILING</i> film	O BEAM COMBENT (mol) 190 O Decr-MARCE 40.0 V01.7 MeV 3.00 Decr-MARCE ♦ Preference 3.50	
4	Press the PROCESS TYPE and choose the MILLING option.	CURRENT (resp) 8.88 TARGET Target1 CURRENT(resp) 10.40	
4	(Make sure the Dummy Target is installed in the Correct target station)	OAS CLEAN (Bitwist) DON GUN WAXAW/Pirect) 300 GAS FLOW 130 ACCELERATOR VOLTAGE (M) 120 SPUTTERNO THE Involution 6999 File Number Image: 2	
5	Make sure the loaded process is the correct one.		
6	Set the desired time in the "SPUTTERING TIME" field.	Sng Sng	
7	When finished programming the process press the <i>WRITE</i> Button. Wait till the transfer data bar is filled (failing to do so will run a previously inserted project)	Image: state stat	
8	Return to MAIN screen by clicking the <i>Main tab</i> .		
9 10	Click the START PROCESS button The Login Dialog will open; fill in user name, password, group name andcomments.	2 Image: Second LogFile Help Image: Second LogFile Help Image: Second LogFile About 2 Image: Second LogFile Help Image: Second LogFile Image	
11	The machine will then start the process automatically.	Image: Construction of the construction of	
12	The film and milling process step are indicated in the window located above the <i>START</i> , <i>STOP</i> , and <i>RESET PROCESS</i> buttons.	Target 3.1E-510rr V7 00:01:05 1 2 3 4 V4 V1 V2 10:K Cobalt Dummy 10 K V2 10 K 10 K 20:E-10rr P 2 00:01:05 10 K 10 K 10 K 10 K 20:E-10rr P 2 00:01:05 10 K 10 K 10 K 10 K 20:E-10rr P 2 00:01:05 10 K <	
13	Every film will sequence through the following steps:	Viscum Skip Active Layer 1 Current Cycle State Process State Process Proces Process Proces Proces Proces Proces Proces	
	 Vacuum step: Waits till the chamber reaches 5E-6 Tor Gas stabilization: Stabilizes the 	j 900 j 1000	





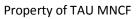
14		
4		Sample Removal
1	Make sure the sample holder is in the <i>MILLING</i> position #4(180°) (sputtering holder attach to the door)	
2	Open the chamber door.	
3	Remove the sample from the sample holder.	
4	 After finishing the milling process return the sample holder to its home position by the following steps: Release the sample holder by releasing the locking nuts. Lift the sample holder into position by lifting the sample until it reaches its upper most position. Retighten the locking nuts. 	
5	Pump the chamber by clicking the " <i>HIGH VACUUM</i> " button on the main menu.	
6	LOG OUT	





FIGURE 2.4 Schematic Diagram of the 12 cm Ion Source







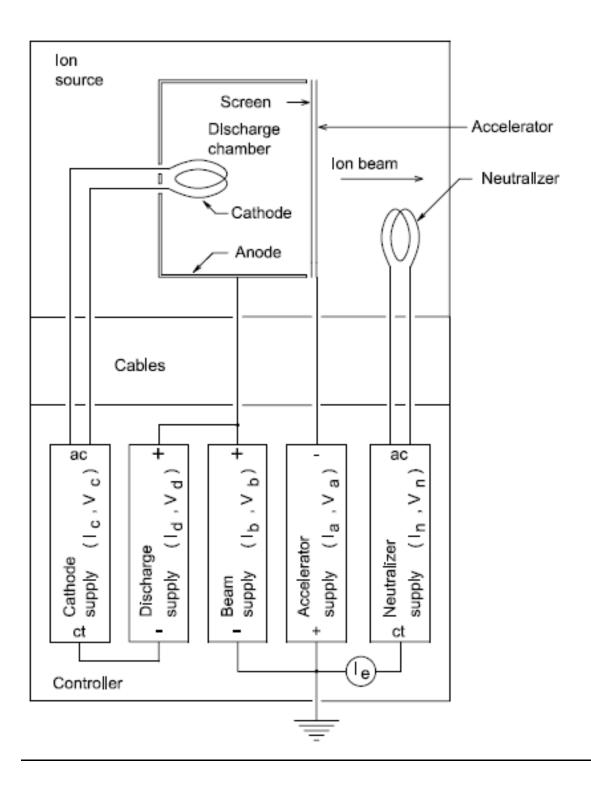


Table 4.1: Argon Flow for a Range of Beam Currents



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I _b , mA	Ar Flow
90	11
170	12
240	13
480	18
510	20

Table 4.2: Maximum Beam Current for a Range of Ion Beam Voltages

l _b , mA	V _b , V	V _a , V
90	300	60
170	400	80
240	600	120
480	800	160
510	1000	200

Table 5.1: Approximate Discharge Currents for a Range of Beam Currents

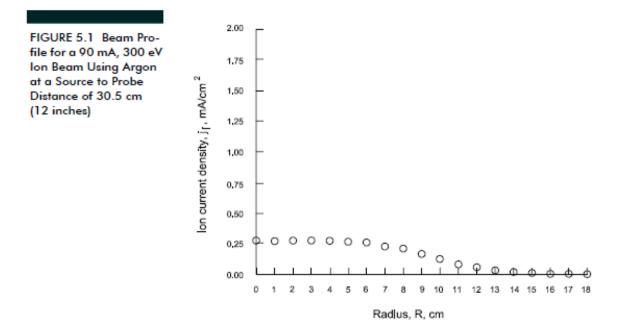
	V _b , V	l _b , mA	V _a , V	l _d , A
-	300	90	60	1.2
	400	170	80	2.2
	600	240	120	2.8
	800	480	160	5.6
	1000	510	200	6.0

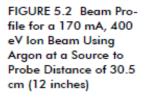
Table 5.2: Maximum Beam Current for a Range of Ion Beam Voltages

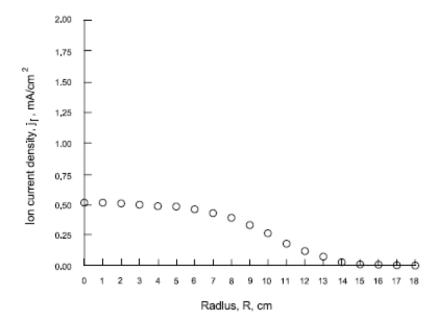
I _b , mA	V _b , V	V _a , V
90	300	60
170	400	80
240	600	120
480	800	160
510	1000	200





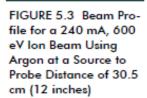












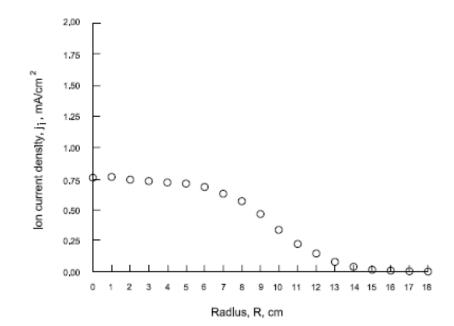


FIGURE 5.4 Beam Profile for a 480 mA, 800 eV Ion Beam Using Argon at a Source to Probe Distance of 30.5 cm (12 inches)

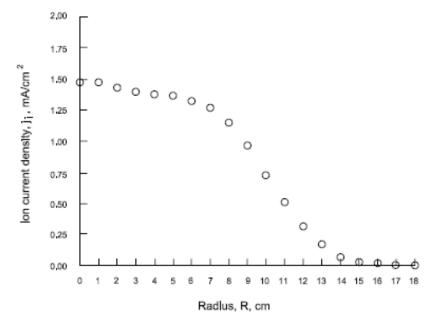
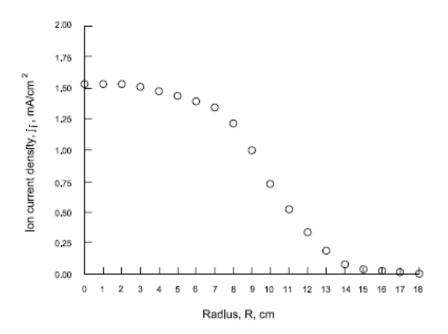






FIGURE 5.5 Beam Profile for a 510 mA, 1000 eV Ion Beam Using Argon at a Source to Probe Distance of 30.5 cm (12 inches)





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