019-Step 1.

OPERATION: INITIAL OXIDATION

TEMPERATURE: 1050°C

PROCEDURE:

STEP	PROCEDURE	SETTING
1.	Turn off Nitrogen	
2.	Turn on Oxygen	13 GL
3.	Leave Oxygen on 15 minutes - Purge	
4.	Remove end cap, attach elephant with wafers previously loaded onto ladder boat	
5.	Push ladder boat into center hot zone, 5-10 seconds push	
6.	Attach vented cap to exhaust - @ [illegible]?	
7.	After five minutes, turn off Oxygen, turn on O_2-HCl	11.3 SS
8.	After 40 minutes, turn off O_2-HCl, turn on Oxygen	13 GL
9.	After 5 minutes, withdraw boat into elephant via 10-15 second pull	
10.	Remove elephant, replace end caps onto furnace tube and elephant	
11.	Turn off Oxygen	
12.	Turn on Nitrogen	5.5 SS

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Note: Step #2 is missing

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019-Step 3

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PHOTO RESIST STRIP - CAROS

EQUIPMENT:

1) Hot Plate
2) 3000 ml beaker
3) Teflon boat and trigger handle

PROCEDURE:

1) Place 1500 ml of Sulfuric Acid onto hot place and heat to max. of 40°C.
2) Pour in 1500 ml of Hydrogen Peroxide. (unstabilized) Providing temp is not above 40°C.
3) Check reaction temp for a minimum of 140°C.
4) Place wafers into caros for 15 minutes.
5) Remove work and place into 1st rinse tank for 2 minutes.
6) Move work to 2nd rinse tank for 5 minutes.
7) Super Q
8) Spin Dry

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019 - Steps 4, 7, 33

OPERATION: PYROLYTIC OXIDE DEPOSITION (PACIFIC WESTERN MACHINE)

TEMPERATURE: 410°C ± 5°C (By Thermocouple)

PROCEDURE:

STEP	PROCEDURE	SETTING
1.	Heat up machine with city water on	13 SS
2.	Turn Temperature controller to	≅435
3.	Turn on Oxygen	6.5 SS
4.	Turn on Silane	7 SS
5.	Check Nitrogen flow rates*	N_2 10 SS N_2 9 SS
6.	Check exhaust setting on magnehelic	20-30
7.	When susceptor is up to temperature, load wafers 2 or 3 abreast (Maximum of 18 wafers per susceptor)	
8. **	Adjust speed setting to that required such that thickness specified is obtained with 1 pass of susceptor under gas distribution head	
9.	Start susceptor scan	
10.	Remove deposited wafers after susceptor stops	
11.	When all wafers are deposited per 7-10, turn off Silane and Oxygen***	
12.	Turn off main power to machine	

* For Bosphorus glass deposition, open fully dopant flow meter and set digital meter at 5.5 and 7.3 for Diborane (B_2H_6) and Phosphine (PH_3) respectively; these settings will result in dopant flow meter reading of ≅ 10 SS after 3-5 minutes purge.

** Speed settings are as follows for various glasses required:

REQUIREMENT	SETTING
13 Mole% Bosphorus Glass (7500A°) [handwritten: 8500]	[handwritten: ~175] ≅ 180 (2.3 in/min)
Undoped Pyro Overlay (6000A°)	≅ 190 (2.45 in/min)
Undoped Field Oxide (6000A°)	≅ 190 (2.45 in/min)
Undoped Oxide Mask for Nitride (2500A°)	≅ 300 (4.1 in/min)

*** For Bosphorus glass deposition, turn off main Phosphine and Diborane cylinder valves, turn on Nitrogen purge valves, and purge minimum of 10 minutes before turning off machine.

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III WAFER SCRUBBER

MACHINE OPERATION:

(1) Fill pressure tanks

Tank I = FC-93 + H_2O

Tank II = DI H_2O

Tank III= IPA (Iso-propyl alcohol)

(2) Press "ON" button

(3) Press "RECYCLE" button

(4) Insert Teflon boats into respective tracks

(5) Press "Auto Cycle" button & "Cycle Start" button

(6) Check cycle times & spin speeds:

Cycle I = 5" FC93+H_2O - 800 RPM

Cycle II = 3" DI H_2O - 800 RMP

Cycle III = 3" IPA - 800 RPM

Cycle IV = 5" Spin Dry - 6000 RPM

Daily Check Out:

Every morning machine is to be checked out by running 3 virgin wafers thru the complete cycle. Upon completion of scrubbing operation, the 3 wafers are to be checked out for dirt particals under a collimated light soarce. If wafers are dirty notify supervisor immediately.

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019 - Steps 6,9.

OPERATION: FIELD OXIDE DENSIFICATION (019)

TEMPERATURE: 950°C

PROCEDURE:

STEP	PROCEDURE	SETTING
1.	Remove end cap, attach elephant with wafers previously loaded onto ladder boat	
2.	Push boat into center zone, 5-10 second push	
3.	Attach vented cap from elephant to exhaust	
4.	Turn off Nitrogen, turn on O_2-HCl	5.5 SS
5.	After 30 minutes, turn off O_2-HCl, turn on Nitrogen	5.5 SS
6.	After 5 minutes, remove vented cap and withdraw boat into elephant via 5-10 second pull	
7.	Remove elephant, replace end caps onto furnace tube and elephant	

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5062 MASK LEVEL	FIELD	RESIST	PRE-BAKE (1) (9)	SPIN (2)	POST-BAKE (3)	APPROX. EXPOSURE	DEVELOP	INSPECT	PRE-ETCH BAKE (5)	ETCHANT (6)	APPROX ETCH TIME	RINSE	SPIN DRY	INSPECT	STRIP (7)	50:1 (11)	RINSE ROUGH	RINSE SYPHONIC	SUPER Q (10)	SPIN DRY
I N+	DK	AZ 7402	30'/160	5K	30'/180	6±1"	½/½/2	YES	30'/180	BHF	4½-5'	2'-5'	YES	NO	CAROS	To Dewet	2'	5'	15'	YES
										Silicon	1'45"	2'-5'	YES	YES	NO	30" BHF	2'	5'	15'	YES
II DEPLETION	DK	"	"	"	"	10"	"	YES	15'/180	NONE	-	-	-	-	CAROS	45"	2'	5'	15'	YES
III POLY-N+	DK	"	"	"	"	10"	"	YES	30'/180	BHF	45"	2'-5'	YES	YES	CAROS	30"	2'	5'	15'	YES
IV POLY-N?	LT	"	"	"	"	6±1"	"	YES	"	GAS(8)	2½-3'	-	-	YES	-	-	-	-	-	-
										BHF	40"	2'-5'	YES	YES	CAROS	30"	2'	5'	15'	YES
V PRE OHMIC	DK	"	"	"	"	15"	"	YES	"	BHF	3'	2'-5'	YES	YES	CAROS	30"	2'	5'	15'	YES
VI METAL	LT	"	"	"	"	6±1"	"	YES	"	PNA	1-1½'	2'-5'	YES	YES	J-100	-	2'	5'	15'	YES
VII OVERLAY	LT	KTFR	"	"	"	5"	2/1/½	-	"	PASS.	1½'	2'-5'	YES	-	J-100	-	2'	5'	15'	YES

NOTES:

(1),(3),(5) BAKES = TIME/TEMP (MINUTES/°CENTIGRADE)
(2) ALL SPINS 30 SECONDS
(4) AZ = DEVELOPER/RINSE/RINSE (DEVELOPER = 1 PART MF312 to 1 PART D.I WATER
KTFR: XYLENE/1:1/IPA + CONVTEK DRYING
(6) ETCHANTS:
BHF = 4000 ML BHF + 4 ML FC93 (34°C ± 1°C)
50:1 = 60 ML HF + 3000 ML H_2O (ROOM TEMP)
10:1 = 300 ML HF + 3000 ML H_2O (ROOM TEMP)
SILICON = 2500 ML HNO_3 + 1000 ML CH_3COOH + 25 ML HF (ROOM TEMP)
PNA = 3200 ML H_3PO_4 + 200 ML CH_3COOH + 200 ML HNO_3 + 400 ML H_2O + 6 ML FC-93 (55 ± 5°C)
(3)(4)PASS. = 2500 ML BHF + 500 ML CH_3COOH + 50 ML FC-807
(7) STRIPPERS: CAROS - HEAT 1800 ML H_2SO_4 to 40°C; ADD 1200 ml H_2O_2; CHECK TEMP 130°C; STRIP 15 minutes
J-100 - 90-110°C J-100 10 min.; 5' 60°C XYLENE; 2' TCE; 2' Methanol

(8) GAS ETCH - FLOW 3.5, 450w, REFLECTED <20w
(5) OPTIONAL IF DIRECT FROM FURNACE
(10) 2' TANK #1; 2' TANK #2; TANK #3 to 12MSL
(11) 50:1 TO DEWET

INSPECTION GUIDELINES

PHOTO OPERATION	AFTER DEVELOP							AFTER ETCH							
	OVER EXPOSURE	UNDER EXPOSURE	PROPER MASK CONTACT	DEVELOPED PROPERLY	ALIGNMENT	MEASUREMENT REQ'D.			MEASUREMENT REQ'D.	UNDERCUTTING	OVERETCH	CONTACT CLEARED OUT	SNOWFLAKES	BRIDGING METAL	LIFTING METAL
1 - SOURCE DRAIN	✓	✓	✓	✓		✓			✓	✓	✓				
2 - DEPLETION	✓	✓	✓	✓	✓										
3 - POLY - N^+	✓	✓	✓	✓	✓					✓	✓				
4 - GATE	✓	✓	✓	✓	✓	✓			✓	✓	✓				
5 - PRE - OHMIC	✓	✓	✓	✓	✓					✓	✓	✓			
6 - METAL	✓	✓	✓	✓	✓						✓		✓	✓	✓
7 - PASSIVATION	✓	✓	✓	✓	✓					✓	✓				

Step 12, 19, 24, 32, 39 44, 49

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SILICON ETCH (¼-25-10)

PREPARATION:

1	HF - 25 ml	
to 100	Nitric - 2500 ml	@ 34°C
to 40	Acetic - 1000 ml	

(1) Insert 3 dummy wafers into a Teflon etch boat and etch for 1 hour before attempting to etch lot.

(2) After etch has been primed, insert 6 good wafers into etch solution for 1'45".

(3) Rinse and cut a sliver off of one wafer.

(4) Strip in H.F., rinse, dry and measure etch step with dektac. If measurement falls between 1500-2500Å proceed to etch balance of lot - 6 wafers at a time. Note and record measurement on run sheet.

(5) If measurement falls above or especially below the 1500-2500Å range---notify supervisor immediately. DO NOT PROCEED WITH BALANCE OF LOT!

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