

# Tool Set

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## Tool Set Links

- [Current Tool Status](#)
- [SMFL Tool Reservation System](#)
- [Information on Processing Specific materials in the SMFL Materials](#)

## Tool Groups

### Lithography

Tool	Certification	Use
GCA Stepper	Required	5x Stepper for exposure of 100mm substrates - g-line
ASML PAS 5500/200 Stepper	Required	5x Stepper for exposure of 150mm substrates - i-line
Heidelberg DWL 66+	Required	Exposure system for direct write or maskmaking
Suss MA150 Mask Aligner	Required	1x Contact Aligner for exposure of 150mm substrates - broadband/i-line
Suss MA56 Mask Aligner	Required	1x Contact Aligner for exposure of multiple size substrates - broadband
SVG 88 Wafertrack #1	Required	Coat/Develop track for 150mm substrates
SVG 88 Wafertrack #2	Required	Coat/Develop track for 150mm substrates
CEE Resist Coater	Required	Manual Coat for photoresist only - 100 /150mm
CEE Resist Developer	Required	Manual Develop for photoresist - 100 /150mm
SCS 6700 Spincoater	Required	Manual Coat for SU8 / Polyimides / SOG - multiple sizes

### Physical Vapor Deposition

Tool	Certification	Use
CVC 601 Sputter	Required	DC sputter of metals / conducting targets

PE4400 RF Loadlock Sputter	Required	RF Sputter of conducting and insulating targets, loadlocked
CHA Ebeam Evaporator	Required	Eight pocket electron beam evaporation
CHA Flash Evaporator	Required	Flash evaporation of Al wire
CVC Thermal Evaporator	Required	Thermal evaporation
Denton Sputter	Required	Sputtering of gold on SEM samples
Anatech Sputter	Required	Sputtering of carbon on SEM samples

## Dry Etch

Tool	Certification	Use
LAM 4600 Al Etcher	Required	Used for dry etching of aluminum metal layers
LAM 490 AutoEtch	Required	Plasma Etch of silicon and silicon nitride
AME P5000 Chamber C	Required	Reactive Ion Etching of silicon dioxide
Trion Reactive Ion Etcher	Required	Used for reactive ion etching of silicon & silicon nitride
GaSonics Aura 1000 Asher	Required	Used for oxygen plasma stripping of photoresist on contamination threat wafers
STS ASE Deep Silicon Etcher	Required	Deep silicon etching using the Bosch Process
Xactic XeF Etcher	Required	Used for surface release etching of silicon

## Thermal & Implant

Tool	Certification	Use
AG 610A RTP	Required	Rapid Thermal Anneal of clean, MOS grade wafers
Bruce Tube 1	Required	Used for wet oxidation of silicon substrates
Bruce Tube 2	Required	Used for diffusion of p-type dopants
Bruce Tube 3	Required	Used for diffusion of n-type dopants
Bruce Tube 4	Required	Used for dry oxidation of silicon substrates
Bruce Tube 5	Required	Fitted with external torch for low temp wet oxide growth
Bruce Tube 6	Required	Used for wet oxidation of silicon substrates
Bruce Tube 7	Required	Used for low temperature anneals
Bruce Tube 8	Required	Used for high temperature anneals - Contamination threat substrates
Varian 350D Implanter	Required	Used for implantation of boron and phosphorous
Heraeus Vacuum Oven	Required	Used for heat treatment of substrates under vacuum
Blue M Ovens	Not Required	Used for heat treatment of substrates

## Wet Chemical Process

Tool	Certification	Use
Al Etch & Solvent Strip Bench	Required	Tank for aluminum etching & two tanks for solvent strip of photoresist.
BOE & HF Wet Bench	Required	Wet Bench with tanks for BOE, Pad Etch, & HF etching of oxides.
General RCA Bench	Required	Used for RCA Clean of wafers
Manual Processing #1 Wet Bench	Required	Used for general purpose manual chemical processing
Manual Processing #2 Wet Bench	Required	Used for general purpose manual chemical processing & HCl Decontamination
Manual Processing #3 Wet Bench	Required	Used for general purpose manual chemical processing
Manual Processing #4 Wet Bench	Required	Used for general purpose manual chemical processing
MOS RCA Bench	Required	Used for RCA Clean of wafers before gate oxidation
Nitride & Silicon Etch Bench	Required	Etching of Nitride with heated phosphoric and silicon etching with heated KOH
Ultrasonic Wet Bench	Required	Used for the ultrasonic cleaning of silicon wafers - also used in liftoff processes.

## Chemical Vapor Deposition

Tool	Certification	Use
ASM LPCVD Tube 1	Required	LPCVD Low Temperature Oxide
ASM LPCVD Tube 2	Required	LPCVD Nitride, Polysilicon
AME P5000 Chamber A	Required	4" and 6" TEOS at 390C
AME P5000 Chamber B	Required	4" and 6" PECVD Nitride at 400C
SMFL Parylene	Required	Parylene deposition system
Ultratech S200 ALD	Required	Deposition of atomic layer films

## Metrology

Tool	Certification	Use
Leitz Inspection Station	None	Optical linewidth measurement
Leica Inspection Station	None	Optical microscope with image capture
Olympus Microscope Station	None	Optical microscope with Nomarski
Nanometrics Spectrophotometer	None	Measurement of oxide, nitride
Prometrix SpectraMap	Required	Measurement of oxide, nitride
Rudolph AutoEL IV Ellipsometer	Required	Ellipsometry of thin films
Woollam VASE	Required	Ellipsometry using variable angle, multi spectral
Wyko Dynamic Optical Profiler	Required	Dynamic measurement of step heights using interferometry
CDE Res Map	Required	Measurement of film resistivity
Tencor P2	Required	Profilometer measurement of film steps

Amray 1830 SEM	Required	Scanning electron microscope
LEO SEM	Required	Scanning electron microscope

### CMP & Dicing

Tool	Certification	Use
Strausbaugh CMP	Required	Basic CMP tool used for metal polishing
Ecomet Grinder	Required	Rotating platen tool used with abrasive sheets for thinning substrates
Kulicke & Soffa 780 Dicing Saw	Required	Dicing saw for cutting 150mm substrates into smaller rectangular pieces
Tempress Dicing Saw	Required	Dicing saw for cutting 100mm substrates into smaller rectangular pieces