NNCI Dry Etch Capabilities

NNCI Site	Tool	Type	Gases	Application	Wafer size
Cornell	Plasmatherm		SF6, C4F8, O2, Ar	Deep silicon etch	100mm
	Versaline	ICP		Deep Ge etch	
	DSEIII			SOI	
Cornell	Unaxis 770	ICP	SF6, C4F8, O2, Ar	Deep silicon etch	100mm
				Mixed silicon etch	150mm
				Release	
Cornell	Ptherm 770		Cl2, BCl3, SF6, O2, N2	metal etch	
	left chamber	ICP	CH4, H2, Ar	metal etch	100mm
	right chamber		Cl2, BCl3, O2, H2, Ar	III-Vs &	100mm
			SiCl4, SF6 CH4	III-nitrides	
Cornell	Plasmatherm	ICP/ALE	Cl2, HBr, BCl3, C3H3F3	Si, III-V's, AlN,	up to 200mm
	ALE		CH3F, CH4, O2, H2, N2	2D materials	
			SF6, Ar, He	SiO2, Si3N4	
				metal oxides	
Cornell	Oxford 100	ICP	CF4, CHF3, C2F6, C4F8	silicon based	100mm
			C4F6, CH2F2, SF6, Ar	dielectrics	
			O2, N2, CO2	SiO2, Si3N4	
			gas ring	quartz, fused silica	
Cornell	Trion				
	Minilock III	ICP	Cl2, BCl3, O2, Ar, CHF3	chrome etch	100mm
			N2		150mm
					200mm
Cornell	Oxford 100				
	Cobra	ICP	HBr, Cl2, CH3OH, O2,	shallow silicon etch	100mm
			H2, SF6, Ar, BCl3	magnetics etch	
				cryogenic Si etch	
				[F] based metal etch	
				SiC etch	
				diamond etch	
Cornell	Plasmatherm				
	720/740				
	left chamber	RIE/PE	Cl2, BCl3, O2, CH4, N2	Au exposure	up to 200mm
			SF6, Ar		
	right chamber	RIE	Cl2, BCl3, O2,CF4, SF6	2D materials	up to 200mm
			Ar	WSe2, NbSe2, GaSe	
Cornell	Oxford 80+				
	Plasmalab 1	RIE	CF4, CHF3, SF6, Ar, H2	Si, SiO2, SiN	up to 200mm
			O2	Ta, polymers	
Cornell	Oxford 80+				
	Plasmalab 2	RIE	CF4, CHF3, SF6, Ar, H2	Si, SiO2, SiN	up to 200mm
			O2		CMOS only

NNCI Dry Etch Capabilities

NNCI site	Tool	Type	Gases	Application	Wafer size
Cornell	Plasmatherm 72	RIE	CF4, CHF3, SF6, H2 O2	Si, SiO2, SiN W, Ta, polymers	up to 200mm
Cornell	Xactix-XetchX3	Release	XeF2, N2	Silicon	up to 150mm
Cornell	Primaxx uetch	Release	HF, MeOH, N2	Silicon oxide	up to 200mm
Cornell	AJA	Ion Mill	Argon	many materials	up to 150mm
Cornell	Yes Ecoclean	down- stream	O2/N2	PR strip	up to 200mm
	Glenn 1000	PR strip	O2		up to 200mm
	Yes CV200RFS	PR strip	O2		up to 200mm
	Anatech	PR strip Bosch polymer removal			up to 150mm
Harvard	Oxford Cobra	ICP	Cl2, CF4, CHF3, H2, Ar, O2	Si cryo etch metal etch magnetics polymers	up to 150mm
Harvard	Unaxis shuttleline	ICP	HBr, Cl2, BCl3, CH4, H2, Ar, O2, N2	III-V's 200C diamond	up to 150mm
Harvard	STS-LPX	ICP	SF6, C4F8, CHF3, O2, Ar, Cl, HBr, CF4, BCl3 H2, N2	Si, Si dielectrics, BN, SiC, graphene	up to 150mm
Harvard	STS Rapier	ICP	SF6, C4F8, O2, Ar N2	deep silicon etch	up to 150mm
Harvard	South Bay	RIE	SF6, CHF3, CF4, Ar,O2	silicon silicon based dielectrics	up to 150mm
Harvard	Ulvac-570	NLD	CF4, CHF3, C4F8, C3F8, N2, O2, Ar, Cl2	Si dielectrics, TiO2, LiNbO3, Al2O3	up to 150mm
Harvard	PT Versaline	ICP	BCl3, Cl2, HBr, CH4 O2, Ar, H2, N2	diamond	100mm
Harvard	Intlvac	IBE	Ar, O2	diamond, noble metals, oxides	up to 150mm

NNCI Dry Etch Capabilities

NNCI site	Tool	Type	Gases	Application	Wafer size
Harvard	Xactix e2	release	XeF2, N2	Si, BN	up to 150mm
Harvard	Anatech 1	PR strip	O2	PR strip	up to 100mm
Harvard	Samco	PR strip	UV /O3	PR strip	up to 150mm
Harvard	Matrix	PR strip	O2	PR strip	up to 150mm
Stanford	Plasmatherm Versaline DSE	ICP	SF6, C4F8, O2, Ar	deep silicon etch SOI	100mm 150mm
Stanford	Plasmatherm Versaline	ICP	Cl2, BCl3, SF6, CF4, CH4, O2, Ar, N2	metals	up to 150mm
Stanford	Plasmatherm Versaline	ICP	C4F8, CHF3, CF4, H2, Ar, O2, N2, He	silicon based dielectrics SiC, diamond	100mm 150mm
Stanford	Oxford 100 Cobra	ICP	BCl3, Cl2, HBr, CH4, H2 SF6, O2, Ar, N2	III-V's GaN, AlGaN	100mm
Stanford	Oxford 80	RIE	CHF3, CF4, SF6, Ar, O2	Si, SiC, diamond Si dielectrics polyimide	up to 200mm
Stanford	Lam 9400	TCP	HBr, Cl2, CF4, C2F6, O2, N2, H2, He/O2	Si, Ge, SiGe, SiO2, Si3N4 poly-silicon	100mm
Stanford	STS Multiplex Pro ASE	ICP	SF6, C4F8, O2	deep silicon etch SOI, SiGe, Ge	100mm
Stanford	AMAT P5000	MRIE	Cl2, CF4, Ar,N2 CHF3, He,O2 HBr, NF3, SF6	Al-Si, Al, Ti, TiN, TiW Si, SiC, polyimide Si based dielectrics Si, SiGe, Ge, W, WSi2 poly silicon	100mm 100mm 100mm
Stanford	AMT oxide etcher	RIE	CHF3, SF6, NF3, Ar, O2	Si, SiC, C, polyimide silicon based dielectrics	100mm
Stanford	Drytek-100	RIE	CF4, SF6, CHClF2, O2	Si, Si dielectrics, C, polyimide	up to 150mm
Stanford	MRC	RIE	O2, Ar, SF6, CHF3, CHClF2	metals, metal oxides, polyimide	up to 150mm
Stanford	Drytek 2	RIE	SF6, O2, CF4, CHClF2	varied materials	100mm
Stanford	Gasonics	PR strip	O2	PR strip	100mm

NNCI Dry Etch Capabilities

NNCI site	Tool	Type	Gases	Application	Wafer size
Stanford	Matrix	PR strip	O2	PR strip	100mm
Stanford	Technics	PR strip	O2	PR strip	up to 200mm
Stanford	SPTS microetch	Vapor HF	HF, EtOH, N2	SiO2	200mm
Stanford	Xactix	XeF2	XeF2, N2	Si, Ge, SiGe	150mm
Stanford	Samco PC300	PE	CF4, SF6, O2	PR, Si, Si dielectrics	up to 200mm
Stanford	Intlvac	ion mill	Ar	varied materials	up to 100mm
Stanford-SNSF	Oxford Plasma Pro-80	RIE	CF4, CHF3, Ar, O2, SF6	Si, SiO2, Si3N4,Ti, TiN, W C, polyimide	up to 200mm
Georgia Tech	STS-AOE	ICP	C4F8, SF6, O2, H2, CF4	SiO2, quartz, pyrex, fused silica, Si, SiN	150mm
Georgia Tech	STS ASE	ICP	C4F8, SF6, O2, Ar	deep silicon etch SOI	100mm
Georgia Tech	STS Pegasus	ICP	C4F8, SF6, O2, Ar	deep silicon etch	150mm
Georgia Tech	STS HRM	ICP	C4F8, SF6, O2, Ar, CO2	deep silicon etch SOI	150mm
Georgia Tech	Plasmatherm 770 SLR	ICP			
	right chamber		C4F8, SF6, O2, Ar	deep silicon etch	up to 150mm
	left chamber		Cl2, BCl3, C4F8, CF4, H2, Ar, O2	III-V's, SiO2, SiN Al, other metals	100mm
Georgia Tech	STS-SOE	ICP	Cl2, BCl3, HBr, CHF3 CH4, H2, CF4, Ar, O2, N2	shallow silicon III-V's	100mm
Georgia Tech	Oxford Cryogenic 100	ICP	Cl2, BCl3, SF6, CHF3, CO2, C4F8, H2, Ar, H2 He	Silicon silicon based dielectrics metals	100mm
Georgia Tech	Plasmatherm 790	RIE			
	left chamber		Cl2, BCl3, O2,Ar	III-V's, silicon Al, Cr, metals	up to 200mm
	right chamber		CHF3, CF4, SF6, O2, Ar	Si, SiO2, SiN, SU8, BCB, polyimide	4-100mm
	AMMT VHF	Release	VHF, H2O	SiO2	up to 100mm

NNCI Dry Etch Capabilities

NNCI site	Tool	Type	Gases	Application	Wafer size
Georgia Tech	Plasmatherm 720	RIE	Cl2, BCl3, O2, H2, Ar	III-V's, Al, Cr, Ti, Si	up to 200mm
Georgia Tech	Unaxis	RIE	Cl2, O2, Ar, BCl3	shallow silicon	3-100mm
Georgia Tech	Oxford 80 Plasmalab Endpoint	RIE	CF4, CHF3, Ar, O2	silicon based dielectrics	up to 100mm
Georgia Tech	Vision 320	RIE	CF4, SF6, Ar,N2,O2,H2	silicon silicon based dielectrics	up to 200mm
Georgia Tech	Xactix E1	XeF2	XeF2	Si	up to 100mm
Georgia Tech	Gasonics Aura 1000	PR strip	O2	PR strip	up to 150mm
	YES	PR strip	O2	PR strip	up to 200mm
	LFE	barrel	O2	descum/activate	up to 100mm
	Technics Micro RIE		O2, N2	descum/activate	up to 100mm
Nebraska	Oxford Plasma Pro Estrelas	ICP	C4F8, CHF3, CF4, SF6, O2, Ar	Si deep etch cryo deep etch	up to 100mm
Nebraska	Trion Minilock Phantom III	ICP	BCl3, Cl2, CF4, SF6, Ar, O2	Metals, Si, polymers	up to 300mm
Nebraska	Intlvac Nanoquest-I	ion mill	Ar, O2, N2	varied materials	up to 100mm
Nebraska to be added	Intlvac Nanoquest-I	ion mill	Ar, O2, N2	varied materials	up to 100mm
Louisville	Trion Minilock Phantom III	ICP	BCl3, Cl2, CHF3, CF4, SF6, O2, Ar	Si, SiO2, GaAs, GaN, Ti, Al, Au, Pt, Cr	up to 200mm
Louisville	March RIE CS 1701	RIE	CHF3, CF4, H2, O2	SiO2, Si3N4, PR, Parylene, Polyimide organics, descum	up to 150mm
Louisville	STS DRIE	ICP	SF6, C4F8, Ar, O2, N2	Si deep etch	100mm
Louisville	Primaxx VHF	Release	VHF, methanol, N2	SiO2 release	up to 200mm
Louisville	Xactix E2	Release	XeF2	release	up to 150mm

NNCI Dry Etch Capabilities

NNCI site	Tool	Type	Gases	Application	Wafer size
N.Carolina Chapel Hill	Alcatel AMS100	ICP	SF6, C4F8, CH4, Ar, He, O2	Si deep etch Si dielectrics quartz Ti, Ta, W	up to 150mm
NCSU-NNF	March PM-600	barrel asher	O2	PR strip	up to 150mm
NCSU-NNF	Oxford Plasmalab 100	ICP	Cl2, BCl3, SF6, O2, Ar	III-Vs, poly Si sapphire	up to 150mm
NCSU-NNF	Oxford NGP-80	RIE	CF4, CHF3, C2F6, SF6 O2, Ar	Si dielectrics quartz	up to 150mm
NCSU-NNF	Alcatel AMS100	ICP	SF6, C4F8, CF4, O2	Si deep etch	up to 150mm
NCSU-NNF	Oxford 80+	RIE	SF6, CHF3, Ar, O2	Si dielectrics quartz	up to 150mm
Duke-SMIF	SPTS Pegasus	ICP	SF6, C4F8, Ar, O2	Si deep etch	up to 150mm
Duke-SMIF	Trion Minilock II	ICP	BCl3, Cl2, HBr, SiCl4, CH4, H2, CF4, O2, Ar	III-Vs	up to 125mm
Duke-SMIF	Trion Phantom II	ICP	CHF3, CF4, SF6, O2	Si dielectrics, polymers	up to 200mm
U.Penn	Oxford 80	RIE	CF4, CHF3, SF6, O2, Ar	Si, Si dielectrics, fused silica, quartz,	up to 200mm
U. Penn	STPS Rapier	ICP	C4F8, SF6, Ar, O2	Si deep etch Ge deep etch	100mm
U. Penn	Oxford Cobra	ICP	C4F8, Cl2, BCl3, SF6, O2, Ar, CHF3, CF4	Al203, SiO2, Si3N4, Si, III-Vs Al, Ti, Ta, W, Mo, Cr, ITO GaAs (tertiaries) InP (tertiaries) AlN	up to 100mm
U. Penn	March Jupiter II	RIE	O2, room air	varied materials, PR strip	up to 200mm
U. Penn	Xactix XeF2	release	XeF2	Si isotropic	up to 150mm
U. Penn	Anatech 1	barrel ashing	CF4, O2, Ar, N2	PR strip, activation	up to 150mm
U. Penn	Anatech 2	barrel ashing	O2	PR strip, activation	up to 200mm

NNCI Dry Etch Capabilities

NNCI site	Tool	Type	Gases	Application	Wafer size
Minnesota	SPTS Rapier	ICP clamped	C4F8, SF6, O2, Ar	deep silicon etch SiO2	100mm
Minnesota	Oxford PlasmaLab 100-180	ICP clamped	CF4, CHF3, SF6, Cl2, BCl3, Ar, N2, O2	SiN, SiO2, Al2O3, Al, HfO2, ZnO, 2D, III-V perovskites	100mm & 150mm
Minnesota	Intlvac Nanoquest II	Ion Mill	Ar-22cm	various materials	up to 150mm
Minnesota	STS 320	RIE	CF4, CHF3, SF6, Ar,O2	silicon and silicon based dielectrics	up to 200mm
Minnesota	Advanced Vacuum 320	RIE	CF4, CHF3, SF6, Ar, N2, CH3OH	silicon, silicon based dielectrics, magnetic materials	up to 200mm
Minnesota	Xactix E1	XeF2	XeF2, N2	silicon	up to 150mm
Minnesota	Branson	PR strip	O2	PR strip	
Arizona St.	STS ASE	ICP	C4F8, SF6, Ar, O2	Deep silicon etch	100mm
Arizona St.	STS	ICP	Cl2, BCl3, O2, Ar, CH4, H2	III-V's and silicon Al2O3	100mm
Arizona St.	Oxford PlasmaLab 80	RIE	Cl2, BCl3, O2, N2, Ar, CF4	III-V's, metals some dielectrics	up to 200mm
Arizona St.	Oxford PlasmaLab 80	RIE	CF4, CHF3, SF6, O2,Ar	silicon and silicon based dielectrics, diamond	up to 200mm
Arizona St.	Oxford PlasmaLab 80	RIE	CHF3, CF4, SF6, Ar, O2	silicon and silicon based dielectrics, metals	up to 200mm
Arizona St.	Xactix E-1	XeF2	XeF2, N2	silicon	up to 200mm
Arizona St.	PT 790	RIE	F-based chemistry	Si, Si dielectrics Ru, Ni, Nb, polyimide BARC	up to 200mm
Arizona St.	PT Apex SLR	ICP	BCl3, Cl2, O2,Ar, N2	III-Vs	up to 150mm
Arizona St.	Tegal 411	PR strip	O2	PR strip	
Arizona St.	Tegal 412	PR strip			
	Tegal 512	PR strip			

NNCI Dry Etch Capabilities

NNCI Site	Tool	Type	Gases	Application	Wafer size
Washington	STPS Rapier	ICP E-chuck	SF_6, C_4F_8, Ar, O_2 N_2	Deep Si etch	up to200mm
Washington	Oxford 100 cryo-chuck	ICP-380	SF_6, C_4F_8, Ar, O_2	deep silicon etch	up to 150mm
Washington	Oxford 100 300C	ICP-180	Cl_2, BCl_3, SF_6, CH_4, H_2, N_2, O_2, Ar	silicon III-V's, Ti, Al	100mm
Washington	Oxford 100 cryo-chuck	ICP-180	SF_6, C_4F_8, CHF_3, N_2O SiH_4, N_2, Ar, O_2 SiO_2-PECVD	silicon silicon based dielectrics, Nb, W, Ti metals, polymers	100mm
Washington	Advanced Vacuum Vision 300MK2	RIE	CF_4, CHF_3, SF_6, O_2,Ar	silicon silicon based dielectrics	up to 300mm
Washington	Advanced Vacuum Vision 300MKII	RIE	CF_4, CHF_3, SF_6, O_2,Ar N_2	silicon silicon based dielectrics	up to 300mm
Washington	SPTS Primaxx uEtch VHF	release	VHF	silicon dioxide	up to 200mm
Washington	SPTS Xactix e2 XeF_2	release	XeF_2	silicon	up to 150mm
Washington	YES CV2--RFS	asher	CF_4, O_2, Ar N_2	PR strip	up to 200mm
Washington	AutoGlow Barrel Etch	PR strip	O_2, N_2	PR strip	varied
Texas	Plasmatherm Versaline DSE	ICP	SF_6, C_4F_8, O_2, H_2	deep silicon etch SOI	100mm
Texas	Trion Oracle	ICP			
	chamber1		CF_4, SF_6, CHF_3, O_2, Ar N_2, He	quartz	up to 200mm
	chamber2		SO_2, CO_2, C_2H_6, Ar, N_2, He, O_2	imprint	up to 200mm
	chamber3		Cl_2, CF_4, He	chrome	up to 200mm
Texas	Oxford 100	ICP	HBr, Cl_2, BCl_3, SF_6, $SiCl_4$, CH_4, H_2, O_2, N_2, Ar	III-V's	up to 100mm

NNCI Dry Etch Capabilities

NNCI Site	Tool	Type	Gases	Application	Wafer size
Texas	Oxford 80	RIE	Cl2, CHF3, SF6, CH4, H2, N2, Ar	Si, SiGe, III-V's, polymers	up to 200mm
Texas	Plasmatherm 790#1	RIE-right chamber	BCl3, SiCl4, CF4, CH4, H2, SF6, O2	III-V's	150mm
	left chamber	PECVD	N2o, NH3, N2, SiH4(10%in He)	SiO2/Si3N4	
Texas	Plasmatherm 790#2	RIE			up to 150mm
	left chamber		Cl2, HBr, CF4, O2, He	silicon, polysilicon	
	right chamber		CHF3, O2, H2, Ar	silicon oxide	
Texas	Plasmatherm Batchtop	RIE	Cl2, HBr, CF4, O2	Si, SiGe, high k dielectrics	up to 150mm
Texas	STS	ICP	HBr, Cl2, CF4, O2, Ar	Si, SiGe, high k	up to 200mm
Texas	LAM Exelan 2300	RIE	C4F8, CF4, HBr, SF6, CHF3, CO, CO2, N2, H2, Ar, O2	polymers, BCPs	300mm
Texas	AJA Orion	ion mill	Ar Si3N4 deposition	many materials	up to 100mm
Montana St.	Oxford 100	ICP	Cl2, SiCL4, BCl3, SF6, Ar, O2, N2, H2, HBr	cryo Si etch III-Vs, Al2O3, Al, Cr, LiNbO3, SiO2	up to 100mm
Montana St.	PVA Tepla Ion Wave 10	barrel asher	O2, Ar	resist removal	
Montana St.	March 1703	RIE			
U. Chicago	Plasmatherm Versaline	ICP	SF6, C4F8, Ar, O2, N2	Si deep etch	up to 200mm
U. Chicago	Plasmatherm	ICP	Cl2, BCl3, SiCl4, H2,Ar HBr, SF6, C4F8, N2, He, O2	metals, III-Vs, SiC. Y2O3	up to 150mm
U. Chicago	Plasmatherm	ICP	SF6, C4F8, Ar, O2, N2 CF4, CHF3, He	Si, SiC, SiO2, Si3N4, Nb, MoS2, TiO2 noble metals allowed	up to 150mm
U. Chicago	Memsstar Orbis Alpha	release	vapor HF N2, H2O	silicon oxide	up to 200mm
U. Chicago	Ion Wave 10	plasma asher	O2	resist removal	up to 200mm
U. Chicago	YES CV200	plasma asher	O2	resist removal	up to 200mm

NNCI Dry Etch Capabilities

NNCI Site	Tool	Type	Gases	Application	Wafer size
U. Chicago	YES G1000	asher	O2	multi-mode ashing	
U. Chicago	XeF2	release	XeF2, N2	Si	up to 150mm
U. Chicago	Plasmatherm	ICP	SF6, C4F8, Ar, O2, N2 CF4, CHF3, He	Si, SiC, SiO2, Si3N4	up to 150mm
Northwestern	STS Pegasus	ICP	SF6, C4F8, Ar, O2	Si deep etch	100mm
Northwestern	Samco RIE 10NR	RIE	CF4, CHF3, SF6, O2, Ar, N2	Si, Si dielectrics	up to 200mm
Northwestern	Xactix	release	XeF2, N2	release, Si etch	up to 100mm
UC San Diego	Oxford 100	ICP	CHF3, C4F8, CF4, Ar, SF6, O2	Si, SiO2	up to 150mm
UC San Diego	Trion	ICP	SF6, Cl2, BCl3, CF4, CH4, O2, H2, He	III-Vs, oxides, polymers, metals	up to 150mm
UC San Diego	Oxford 80	RIE	Cl2, BCl3, CHF3, CF4, SF6, O2, Ar	oxides, nitrides metals polymers,	up to 150mm
UC San Diego	Plasma Etch 100	asher	O2	resist removal polymers,	up to 200mm
UC San Diego	Tepla 100	asher	O2	resists, polymers	up to 100mm
UC San Diego	Xactix-E1	release	XeF2	release, Si etch	up to 150mm
UC San Diego	Plasmatherm SLR	ICP	CHF3, C4F8, CF4, Ar SF6, O2	Si, SiO2	
UC San Diego	Idonus HF VPE	release	VHF	release SiO2	up to 150mm
Virginia Tech	Alcatel	ICP	SF6, C4F8, Ar, O2	Si deep etch	100mm
Virginia Tech	Trion	ICP	CF4, SF6, CHF3, HBr, Cl2, BCl3, SiCl4, O2	III-Vs, Al2O3, Si dielectrics	up to 200mm