Rochester Institute of Technology	Dr. Lynn Fuller			Revised: 6/27/2013
Microelectronic Engineering	EMEDEPT-LFF……./Old_Desktop/Factory/			
Summary of Etch Rates and Deposition Rates for RIT Processes				
Wet Etch Process Description	**Date**	**Rate**	**Units**	**Comment**
5.2:1 Buffered Oxide Etch (Transene) of Thermal Oxide, 300°K	2/12/2008	1200	Å/min	EMCR650
5.2:1 BOE (Transene) Etch of PECVD TEOS Oxide, no anneal, 300°K	2/12/2008	3840	Å/min	EMCR650
5.2:1 BOE (Transene) Etch of PECVD TEOS Oxide, anneal 1000C - 60 min, 300°K	1/22/2008	2029	Å/min	EMCR650
5.2:1 BOE (Transene) Etch of PECVD TEOS Oxide, anneal 1100C - 6 hr, 300°K	2/18/2008	1212	Å/min	EMCR731
5.2:1 BOE Etch of LPCVD LTO	1/30/2009	3000	Å/min	Ivan Puchades
10:1 Buffered Oxide Etch of Thermal Oxide, 300°K	10/15/2005	586	Å/min	Mike Aquilino
10:1 BOE Etch of PECVD TEOS Oxide, no anneal, 300°K	10/15/2005	2062	Å/min	Mike Aquilino
10:1 BOE Etch of PECVD TEOS Oxide, anneal 1000C - 60 min, 300°K	10/15/2005	814	Å/min	Mike Aquilino
10:1 BOE Etch of PECVD TEOS Oxide, anneal 1100C - 6 hr, 300°K	10/15/2005	562	Å/min	Mike Aquilino
Pad Etch (Fuji Film 16,3,3) on Thermal Oxide, 300 °K	9/22/2008	650	Å/min	Jessica Marks
Pad Etch of PECVD TEOS Oxide, 300°k	6/8/2006	1290	Å/min	Dale Ewbank
Pad Etch of LPCVD LTO	1/30/2009	1800	Å/min	Ivan Puchades
Hot Phosphoric Acid Etch of Thermal Oxide at 175 °C	10/15/2005	<1	Å/min	Mike Aquilino
Hot Phosphoric Acid Etch of TEOS Oxide, no anneal, at 175 °C	10/15/2005	17	Å/min	Mike Aquilino
Hot Phosphoric Acid Etch of TEOS Oxide, 1000 C 60 min Anneal, at 175 °C	10/15/2005	3.3	Å/min	Mike Aquilino
Hot Phosphoric Acid Etch of TEOS Oxide, 1100 C 6 Hr Anneal, at 175 °C	10/15/2005	3.8	Å/min	Mike Aquilino
Hot Phosphoric Acid Etch of Si3N4 at 175 °C	11/15/2004	82	Å/min	EMCR650
50:1 Water:HF(49%) on Thermal Oxide at room T	6/27/2013	147	Å/min	Celia Sherry
50:1 Water:HF(49%) on PECVD TEOS Oxide, no anneal, at room T	10/15/2005	611	Å/min	Mike Aquilino
50:1 Water:HF(49%) on PECVD TEOS Oxide, anneal 1000 C -30 min, at room T	10/15/2005	115	Å/min	Mike Aquilino
50:1 Water:HF(49%) of PECVD TEOS Oxide, anneal 1100C - 6 hr, 300°K	10/15/2005	107	Å/min	Mike Aquilino
KOH 20 wt%, 85 °C, Etch of Si (crystaline)	2/4/2005	30	µm/hr	EMCR870
KOH etch rate of PECVD Nitride (Low σ)	2/4/2005	10	Å/min	EMCR870
CVD Deposition Rates & Process Description	**Date**	**Rate**	**Units**	**Comment**
Factory Nitride 810 LPCVD	1/10/2008	62	Å/min	EMCR650
Factory Poly 610 °C	1/21/2007	70	Å/min	Dr. Fuller
Poly (MEMS) 650°C	6/13/2006	160	Å/min	Dr. Fuller
PECVD TEOS Oxide				
PECVD Nitride (Stochiometric)				
PECVD Nitride (Low σ) at 600 watts with chamber clean B6 10M CON NIT	2/11/2005	8000	Å/min	Dr. Fuller
PECVD Nitride (Low σ) at 540 watts with chamber clean (zero stress)	6/7/2006	5460	Å/min	Dr. Fuller
LPCVD LTO from SiH4+O2 at 425C 4"wafers and extra cover on boat	6/9/2006	120	Å/min	Dr. Fuller
LPCVD LTO from SiH4+O2 at 425C 6"wafers and extra cover on boat	6/9/2006	108	Å/min	Dr. Fuller
LPCVD HTO from dichlorosilane + N20, 830 C, DCS 60 sccm, N2O 150 sccm	5/6/2011	20	Å/min	Dr. Fuller

PVD Deposition Rates & Process Description	Date	Rate	Units	Comment
CVC 601 Aluminum at 2000 watts, 5 mTorr, 25 min gives ~7500 Å, 20% nonuniformity	1/25/2007	297	Å/min	Dr. Fuller
PE 4400 Aluminum 400 watts, 5 mTorr, 40 sccm, 125 min gives ~7500 Å	5/15/2011	60	Å/min	Dr. Fuller
PE 4400 Sputter Etch Prior to Metal Two, 500 watts, 40sccm, 5mTorr, 20 min	3/15/2011	??	Å/min	Dr. Fuller
CVC 601 Tantalum 4" target, Alpha Phase Tantalum 30 uOhm-cm, Positive TCR ~ 825ppm				
Thin layer of reactively sputtered TaN followed by Ta only, radiant heating, 200 C, entire time				
Tantalum 4" target, 175 watts, 5.5 mTorr, 43.6 sccm Ar, 16.3 sccm N2, 2 min. Gives ~100Å TaN				
Tantalum 4" target, 175 watts, 5.5 mTorr, 43.6 sccm Ar, 30 min. Gives ~2200Å Ta	7/15/2011	70	Å/min	Dr. Puchades
CVC 601 Tantalum 4" target, Beta Phase Tantalum 200 uOhm-cm, Negative TCR ~ -200ppm				Dr. Puchades
Tantalum 4" target, 500 watts, 5.5 mTorr, 43.6 sccm Ar, 15 min. Gives ~2800Å Ta	7/15/2011	180	Å/min	
PE 4400 Nickel 400 watts, 5mTorr, 40sccm of Ar,	4/22/2011	43.3	Å/min	Dr. Fuller
PE2400 Tantalum				
CVC 601 InSnO 4" Target, 180w, 5 mT, 21 sccm + 425C Sinter gives 24.4ohm/sq	5/10/2011		Å/min	Sarayu Rangarajan

Plasma Etch Process Description	Date	Rate	Units	Comment
Lam 490 FACNIT.RCP, 125 watts, 200 sccm SF6 only, Pressure 260 mTorr, Gap 1.65	2/4/2005	1200	Å/min	Nitride etch rate/Dr. Fuller
Resist Etch Rate using Lam 490 FACNIT.RCP	2/11/2005	1000	Å/min	Dr. Fuller
PECVD Nitride (Low σ) Etched with Lam 490 FACNIT.RCP	6/7/2006	5200	Å/min	Dr. Fuller
Thermal Pad Oxide using Lam 490 recipe FACNIT.RCP	4/20/2011	370	Å/min	Gray McPherson
Tantalum Alpha Phase Metal using Lam 490 recipe FACNIT.RCP	7/15/2011	2100	Å/min	Dr. Puchades
Lam 490 FACPOLY.RCP, 140 watts, 140 sccm SF6, 15sccm O2, Pressure 325 mTorr, Gap 1.65		6000	Å/min	Dr. Fuller
Lam 490 FACRESIST,				
LAM4600 Aluminum Etch,	4/15/2011	35	Å/sec	Dr. Fuller
Step Press, RFTop, RFBot, Gap O2 111, N2 222, BCl 333 Cl2444 Ar 555 CForm 666 End Time				
Step 1 100 0 0 3 0 13 50 10 0 8 Stabl 15				
Step 2 100 0 250 3 0 13 50 10 0 8 Time 8				
Step 3 100 0 120 3 0 20 25 30 0 8 Time **230**				
Step 2 100 0 125 3 0 25 25 23 0 8 Oetch 10%				
Step 5 0 0 0 5.3 0 25 50 10 0 0 Stabl 15				
Drytek Quad LTO spacer - Recipe FACSPCR Step 1				
Chamber 2, 200 watts, 70 mTorr, CHF3 65sccm, O2 5 sccm, Ar 65 sccm				
TEOS	4/4/2010	1000	Å/min	Dr. Fuller
Thermal Oxide	4/4/2010	330	Å/min	Dr. Fuller
Photoresist	4/4/2010	200	Å/min	Dr. Fuller
Drytek Quad Nitride Spacer - Recipe FACSPCR Step 2				
Chamber 2, 250 watts, 40 mTorr, SF6 30sccm, CHF3 30sccm, CF4 10 sccm, Ar 100 sccm				
Nitride	4/4/2010	1250	Å/min	Dr. Fuller
Thermal Oxide	4/4/2010	950	Å/min	Dr. Fuller

	Photoresist	4/4/2010		Å/min	Dr. Fuller
	Drytek Quad FACCUT (for CC and Vias in RIT CMOS Processes)				
	Chamber 3, 200 watts, 100 mTorr, CHF3 50sccm, CF4 10 sccm, Ar 100 sccm				
	TEOS	4/4/2010	494	Å/min	Dr. Fuller
	Annealed TEOS	4/4/2010	450	Å/min	Dr. Fuller
	Thermal Oxide	4/4/2010	441	Å/min	Dr. Fuller
	Photoresist	4/4/2010	117	Å/min	Dr. Fuller
	Silicon	4/4/2010	82	Å/min	Dr. Fuller
	TiSi2	4/4/2010	1	Å/min	Dr. Fuller
	Drytek Quad ZEROETCH	6/1/2011	650	Å/min	Sean O'Brien
	Chamber 3 Step 1 - 100 mTorr - 200 W - CF4 25 sccm, CHF3 50 sccm, O2 10 sccm				
	Etch for Zero level ASML Alignment Marks, 2 min gives 1300Å etch depth in Silicon				