

SILICON DIOXIDE PLASMA ETCH GUIDE

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Purpose: Plasma etch rates of SiO₂ and photoresist (PR) Shipley 1827 for several recipes and 2 tools

Processes: Trion and March plasma etching of thermal SiO₂ (silicon dioxide)

Restrictions/requirements: General cleanroom safety training, training on the Trion and March RIE from cleanroom personnel

Limitations: Reproducibility is governed by a stable DC bias during the etch

Oxide Etch Rate (nm/min)	Shipley 1827 Resist Etch Rate (nm/min)	ICP/Refl (W)	RIE/Refl (W)	DC Bias (V)	Gas 1 (sccm)	Gas 2 (sccm)	He Cooling (Torr)	Pressure (mTorr)	Tool	Comments
80.4		400/10	50/6	-124	CHF3, 40	O2, 3	5	20	Trion	
131		400/10	100/10	-150 to -200	CHF3, 40	O2, 0	5	20	Trion	
98.6	>230	400/10	100/9	-150 to -200	CHF2, 30	CF4, 10	5	20	Trion	
112.4, 118 [†]	> 260, 390 [†]	NA	300/3	?	CF4, 50%	H2, 3%	NA	300	March	
14	44	300/6	25/9	-27 to -23	CHF3, 30	CF4, 10	5	20	Trion	
54.4, 68.4	61, 96.2	300/7	50/6	-150 to -90	CHF3, 40	0	5	20	Trion	Hard baked of PR for 1hr at 115°C
50	58.4	300/7	50/6	-100	CHF3, 40	0	5	20	Trion	Hard baked of PR for 1hr at 115°C

† More than one value indicates results of separate trials.

Best recipe for resist selectivity from above is the last:

Using the Trion Plasma Etcher with resist hard baked for an hour at 115°C

ICP: 300 W Ref: 7 RIE 50 ref: 6 DC Bias: -150 to -90 V

He: 5 torr CHF₃: 40 sccm O₂: 0 Pressure: 20 mT