

SiON DEPOSITION

Gases	2% SiH ₄ in N ₂	300 sccm
	N ₂	900 sccm
	NH ₃	30 sccm
	N ₂ O.....	30 sccm
Pressure		900mT
R. F.		20-40W
Temperature		250°-350°C
Electrode space		0.8-1.0"
SiON deposition rate		120-250Å/min. (n _f dependent)
SiON refractive index (n _f)		1.80-1.55
Uniformity		<±3-4% (n _f dependent)
Etch rate in BHF(6:1)/20°C		quite variable (n _f dependent)
Stress	2X10 ⁹ dynes/cm ² comp	
	2X10 ⁹ dynes/cm ² tensile	
Gas Channels	0-50 NH ₃	(NH ₃)
	0-1000 N ₂	(SiH ₄ /N ₂)
	0-1000 N ₂	(N ₂ O)
	0-1000 N ₂	(N ₂)

GAS FLOW

Total gas flow does not significantly alter deposition rate however gas ratios (i.e. NH₃:N₂O) will dramatically change growth rate as it changes n_f. A continuum is created whereby deposition rate, oxygen concentration and refractive index track with NH₃:N₂O ratio. At lower n_f, deposition rate increases, BHF etch rate increases and stress becomes progressively more compressive as the film is more "oxide-like" in composition.

POWER

Power primarily affects deposition rate. Large increases in power will decrease film uniformity.

PRESSURE

For small changes (< 100mT), pressure has little effect on the process.

TEMPERATURE

Temperature is chosen primarily to be compatible with substrate material (e.g. 250°C for III IV materials, 350°C for Si). Slight changes in refractive index will occur with temperature change. BHF etch rate decreases with increasing temperature.