Si_3N_4 DEPOSITION - STANDARD CAPCITOR/PASSIVATION FILM

Gases	2% SiH_4 in N_2	200 sccm
	N_2	900 sccm
	NH_3	2-3 sccm
Pressure		900mT
R. F.		20W
Temperature		250°-350°C
Electrode space		0.8-1.0"
Si_3N_4 dep rate		100-150Å/min.
Si_3N_4 refractive index (n_f)		2.00 ± 0.02
Uniformity		< ± 3%
Etch rate in BHF(6:1) 20°C		< 800Å/min.
Stress		$3X10^9$ dynes/cm² tensile

Gas Channels	0-20 NH_3	(NH_3)
	0-1000 N_2	(SiH_4/N_2)
	0-1000 N_2	(N_2)

GAS FLOW

This chemistry is quite similar to the "Low Stress" nitride except for the absence of He; without He the film is fixed at a slightly tensile stress state which does not vary with flow. The NH_3/SiH_4 ratio will control n_f and is controllable between 1.85-2.20.

POWER

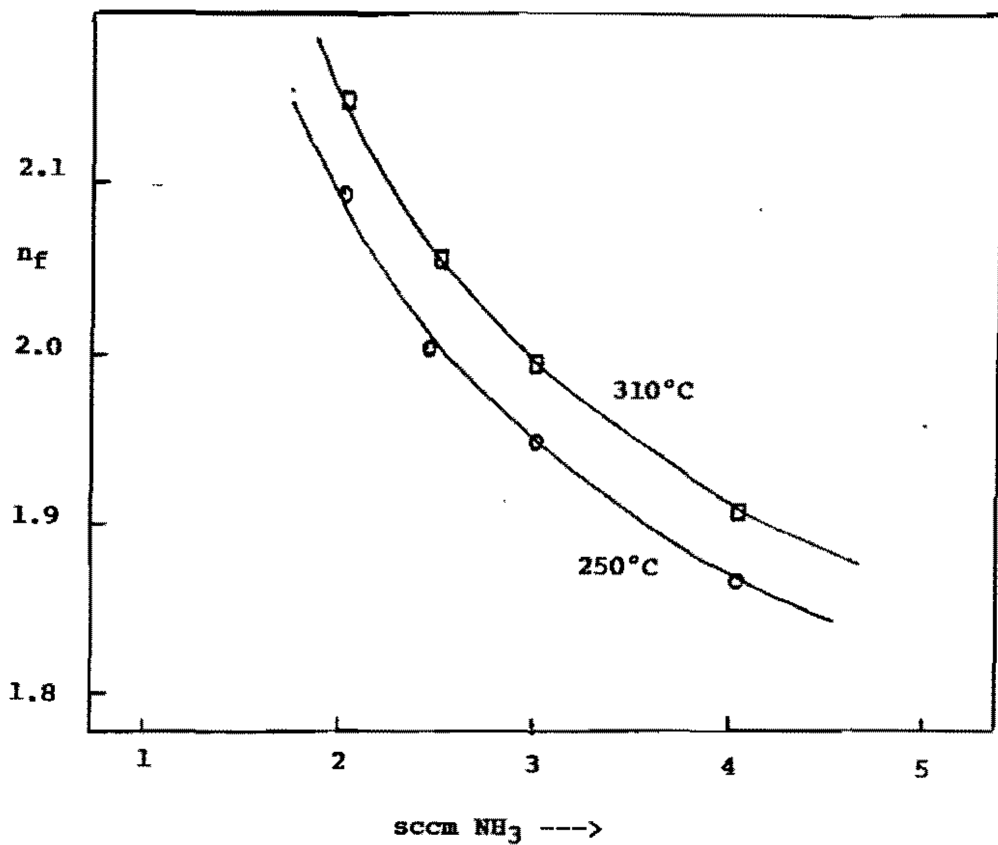
Power will affect dep rate and BHF etch rate; as deposition rate increases, thermally induced H_2 desorption decreases leading to increased [H] in the film and increased etch rate in BHF. Large power increase will degrade film uniformity.

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.



Variation of n_f with $[NH_3]$ for Si_3N_4