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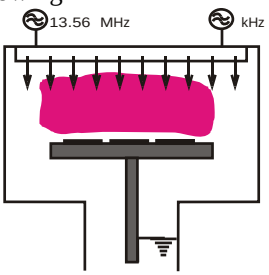
Plasmalab Data

PECVD of Silicon Nitride

Good Step Coverage **Low BHF/ KOH Etch Rate**
Full Stress Control **Excellent Uniformity**

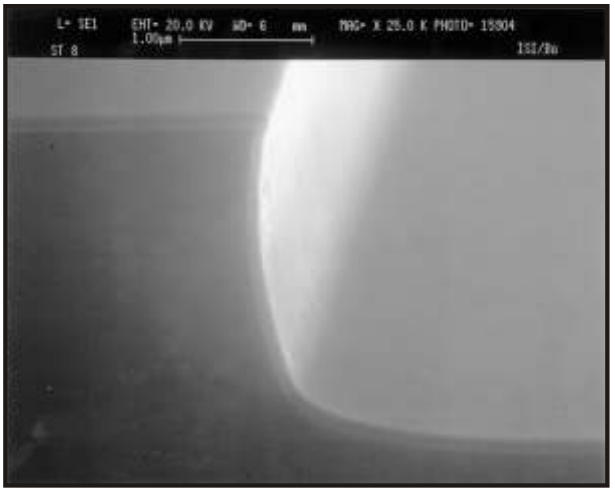
Silicon nitride films are used extensively in the semiconductor industry for device passivation, mechanical protection, capping layers, contaminant barriers, on-chip capacitor dielectrics, interlayer dielectrics and free standing membranes. Plasma Enhanced Chemical Vapour Deposited (PECVD) nitrides are particularly suited to these applications due to their excellent adhesion, step coverage, scratch resistance, and barrier properties (i.e. resistance to ion migration and moisture penetration). The low deposition temperature of PECVD films (200-400°C) is of special importance for applications, in which high temperatures are prohibited e.g. metallized wafers or GaAs. Additionally, film stress can be controlled by selection of suitable process conditions or by mixing of high frequency and low frequency RF power during the deposition. Stress values ranging from moderately compressive to mildly tensile, including near zero stress, can be achieved using the frequency mixing technique. The films can withstand annealing processes at temperatures far in excess of the deposition temperature of the films. OPT has extensive experience in PECVD of silicon nitride films, particularly in tailoring the process to meet the customers individual requirements. Open-load batch loaded or single wafer load-locked/clusterable systems are available. All system are fully automated allowing production capability.



Plasma Enhanced Chemical Vapour Deposition (PECVD)

Plasmalab 80 Plus
Plasmalab 800 Plus
Plasmalab System 100
Plasmalab System 133

Process Chemistry	SiH_4, N_2, NH_3
Deposition Rate	10 - 15 nm/min, max 100 nm/ min
Refractive Index	typically 2.0, but fully controllable 1.8 - 2.5
Uniformity	< 3% deposition rate < 1% refractive index
Film Stress	fully controllable: -1 GPa to +0.5 GPa
BHF (5:1) Etch Rate	< 30 nm/min
KOH Etch Rate	< 0.5 nm/ min
Pinhole/Particle Dens	< 0.1 / cm^2



Courtesy of the Forschungszentrum Jülich, ISI:
70 nm SiN over a 2 µm step (with underetched wall)

Courtesy of IMO Wetzlar:
1 µm low stress SiN over a 1,5 µm step