

InP, InSnO_x, InGaAsP

Gases	.....CH ₄	10 sccm
	.....H ₂	40 sccm
Pressure	.....	40mT
R. F.	.....	150-200W
d.c. bias	.....	400±40V d.c.
Susceptor	.....	Al
Endpoint	.....	laser (InSnO _x)
Gas Channels	.....0-100 N ₂	(CH ₄)
	.....0-100 N ₂	(H ₂)
Etch rate InP	.....	400Å/min.
ITO	.....	100-150Å/min.
InGaAsP	.....	200-400Å/min.
Selectivity to mask	.....	> 10:1 (resist)
Profile	.....	anisotropic

POWER

Etch rate increases with power but little improvement is seen above 250W. With photo-resist as mask, power is limited to 150W. At lower power, excessive deposition (polymerization) occurs.

PRESSURE

Pressure is not critical: at higher pressures excessive deposition (polymerization occurs).

GAS FLOW

This process is unique in that both etching and deposition (of amorphous C-H) occur simultaneously: the rates of the two processes are sensitive to the CH₄/H₂ ratio and to the substrate material. At low CH₄ flows both etch and deposition rates are low. At high CH₄ flows the deposition process predominates. When flows are optimized, slight deposition occurs only on non-etching surfaces (e.g. photo-resist or SiO₂ mask). Under these conditions no mask erosion occurs, permitting deep etches with only a thin mask. Deposited material can be removed post-etch using O₂ plasma.

SURFACE MORPHOLOGY

The etched surface (InP) is smooth and mirror like. Some roughening occurs at higher d.c. bias. Little surface damage occurs as evidenced by ability to re-grow epi layer on etched surface.