

Glow Discharge Proc

SPUTTERING AND PLASMA ETCHING

Brian Chapman

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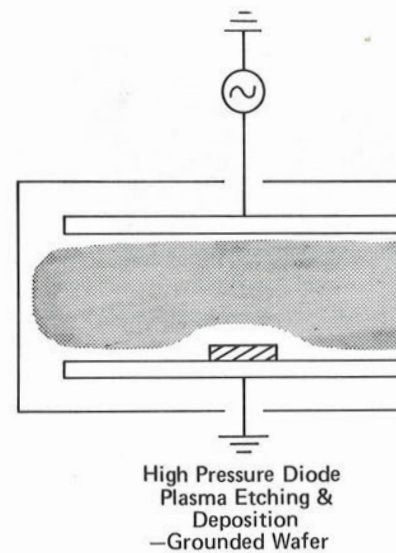


Figure 7-23. High pressure diode plasma etching and deposition.

quarter of the applied rf peak-to-peak voltage (Chapter 7) — 250 V for practical plasma etching processes. This is determined by measurements and by observation of the dark spaces formed. The energy of ion bombardment on an electrode is determined by the sheath thickness and by collisions in the sheath, as discussed in Chapters 7 and 8.

Reactive ion etching systems (Figure 7-24) are essentially diode systems. In sputtering, intense ion bombardment at the target is achieved nowhere else. This is achieved by making the target area a small fraction of the grounded chamber and baseplate. As a result, the sheath is very small, but the sheath at the target, and hence at the electrode, is very large. The rf peak-to-peak, amounting typically to ~300 V.

The different operating pressures of the two diode systems result in ion bombardment energies very greatly, because the number of collisions per unit length at the higher pressure is offset by the much thinner dark space sheath. The two effects would