

Glow Discharge Processes

SPUTTERING AND PLASMA ETCHING

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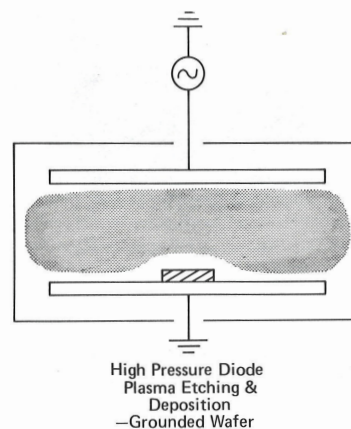


Figure 7-23. High pressure diode plasma etching and deposition-grounded wafer

quarter of the applied rf peak-to-peak voltage (Chapter 5) and so typically 75 V – 250 V for practical plasma etching processes. This is confirmed by electrical measurements and by observation of the dark spaces formed at the sheaths. The energy of ion bombardment on an electrode is determined by the sheath voltage and by collisions in the sheath, as discussed in Chapters 4 and 5.

Reactive ion etching systems (Figure 7-24) are essentially converted sputtering systems. In sputtering, intense ion bombardment at the target is required, and nowhere else. This is achieved by making the target area much less than the area of the grounded chamber and baseplate. As a result, the sheath at the walls is very small, but the sheath at the target, and hence at the wafer, is about half the rf peak-to-peak, amounting typically to ~300 V.

The different operating pressures of the two diode systems should not influence ion bombardment energies very greatly, because the larger number of collisions per unit length at the higher pressure is offset by the consequently much thinner dark space sheath. The two effects would be expected to balance