

ABSTRACT
ADJUSTABLE AND EXTENDED GUIDE RINGS

A carrier head is provided that improves the pressure uniformity of a semiconductor wafer against the polishing pad in chemical mechanical polishing (CMP). The carrier head includes a carrier, a carrier film, and a guide ring. The objective of CMP is to provide planarization of the surface of a semiconductor wafer by uniformly removing material. One embodiment of the invention uses independent adjusting screws threaded in the carrier to provide uniform wafer pressure and lengthen guide ring life. The adjusting screws are threaded internally to accept holding screws attached to the guide ring using a backing. This facilitates variation in the spacing between the carrier and guide ring at each adjusting screw. A locking nut on each adjusting screw is used to maintain each gap setting. This embodiment eliminates the need for shims and the associated trial-and-error set-up time in selecting shims. In addition, compensating for guide ring wear can be easily performed without disassembling the carrier head. A second embodiment uses air vents in the carrier, an L-shaped guide ring, and O-rings between the guide ring and carrier. These modifications prevent polishing slurry from being drawn into the point of contact between the carrier and guide ring. If permitted, dried slurry deposits between the guide ring and carrier would cause variations in applied pressure to the wafer during polishing which in turn would result in non-uniform removal of material during CMP.

(FIGURE 3A IS SUGGESTED FOR PUBLICATION)