



WINNER

1996 R&D 100 Awards Winner

PLASMAX--Plasma Mechanical Cleaner for Silicon Wafers

Features:

PLASMAX combines a plasma with mechanical vibration to be the first in situ, dry, non-contact process for removing particulate contamination from silicon wafers. It can clean wafers inside a plasma chamber even between the individual steps of the plasma process. PLASMAX leaves the surface of materials undamaged, uses inert gases and no solvents, and releases nonpolluting byproducts. Moreover, it is effective, energy efficient, fast, and inexpensive.

Applications:

PLASMAX is designed for cleaning particulate contamination from wafers during the fabrication of integrated circuits. It can also be used for reclaiming blank silicon wafers widely used to test equipment cleanliness; currently such wafers are discarded at losses of tens of millions of dollars. With PLASMAX, we can also clean magnetic storage disks and decontaminate radioactive dust from instruments and weapons. In the future, our process will be used for cleaning compact disks, flat panel displays, medical instruments, and optical components.

Benefits:

- Allows dry, in situ, non-contact cleaning of silicon wafers during multi-step plasma processes.
- Enables engineers to develop new plasma process steps essential to producing advanced chips but too "dirty" to be considered in the absence of a suitable cleaning method.
- Cleans, in seconds, the whole surface of a wafer regardless of its size, during one cleaning step; prevents contaminating particles from redepositing.
- Supports pollution-free manufacturing and, at the same time, increases productivity.
- Uses a flux of ions and electrons to drive the removal of particles, the same method used for etching fine device features, and is thus eminently suited for cleaning such features.
- Reduces integrated-circuit manufacturing costs because the cleaning tool retrofits to processing chambers and requires no additional clean-room space or deionized water.