

Late 1980s

High-density plasma-ion source single-wafer etching system

~ Discrete Semiconductor/Others ~

In the etching process, TOKYO OHKA KOGYO developed a single-wafer plasma etcher in 1977 for etching thin polysilicon film which was vulnerable to chemical etching. Nippon Electric Varian (later CANON ANELVA) developed a multi-chamber, single-wafer RIE (Reactive Ion Etching) equipment in 1978. However, batch processing equipment was main in RIE which became mainstream in the early 1980s due to the slow etching rate. On the other hand, as miniaturization of device pattern proceeded, it became necessary to make the plasma on the wafers more uniform. The need to increase the etching speed with a single-wafer type equipment was enhanced.

High-density plasma ion sources were adopted in the RIE to increase etching speed, and an entire shift to single-wafer process began in the late 80's. Hitachi (later Hitachi High Technologies) developed a single-wafer RIE equipment (M206) using microwave plasma ion sources in 1986. Lam Research subsequently introduced a single-wafer RIE equipment (Rainbow) using CCP (Capacitively Coupled Plasma) in 1987. As a result, the single-wafer etching equipment became the mainstream of dry etching process. Starting with single-wafer dry etching equipment, many manufacturing process including film deposition by plasma CVD and sputtering, as well as oxidation and annealing processes using lump-heating shifted to single-wafer systems.



Microwave-excited plasma source RIE system(M206A)
(Courtesy of Hitachi High-Tech Corporation)

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