To search page

1990s

Start of mass production of single-wafer equipment

Process Technology ~

In development of manufacturing equipment, it is always required to choose either batch type, small batch type, or single wafer type (processing one wafer at a time), while facing to the problems that are contradictory in productivity and process quality. As the motivation for single wafer processing, various requirements such as improvement of uniformity, reduction of dust and reduction of tact time can be raised.

The horizontal batch type PECVD equipment shifted to single wafer processing (including small batch) in the latter half of 1980s. The greatest objective was to improve film thickness uniformity, and the sharp improvement of the single-wafer-processing deposition rate drove the adoption of the equipment.
In addition, the anisotropic plasma method emerged in the etching, and etching process shifted from isotropic wet (batch) type to single wafer type. It was also this time when Applied Materials and Tokyo Electron started selling single wafer etching equipment in 1987 and 1988 respectively. The main motivation in this case was improvement of miniaturization processes by changing from isotropic etching to anisotropic etching.

In 1995, a single wafer RTP equipment was released from AMAT, which triggered the batch annealing furnaces to be partially switched to single wafer type furnaces.
In the 1990s, single wafer cleaning equipment was launched, and single wafer equipment expanded for cleaning Cu and others. In 2000, single wafer cleaning equipment was released from Dainippon Screen.
In the case of LPCVD, although Kokusai Electric and Applied Materials released 2-wafer type and single-wafer type equipment in the 1990, vertical batch type equipment are still widely used and coexist with the single wafer type. It is also the case in ALD generation, and similar situation is seen in epitaxial equipment, too.
In general, shift from batch to single wafer processing has occurred to cope with higher quality requirements, but it is not always the case, along with technology improvement.

Single wafer Cleaning Equipment DNS SPW Series
Release: 6” (1985), 8” (1989), 200mm MP-200 (1995)
The photo is SPW Series

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