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1980s

Plasma CVD (of low-temperature SiO_2/SiN) becomes the mainstream

~ Process Technology ~

In the 1980s, the influence of heat on the interconnect due to miniaturization began to be noticeable, and low temperature plasma CVD equipment for SiN passivation began to be sold from overseas equipment manufacturers. The SiN film has higher moisture resistance than polyimide, low temperature SiO_2 film (LTO) and the like, and superior in passivation characteristics, but low-pressure CVD not using plasma required high temperature of 500°C or more. Therefore, in the passivation process after the metal interconnect, plasma CVD capable of lowering the temperature to about 400°C was adopted. Japan ASM began domestic production quickly, and a batch type plasma CVD apparatus incorporating a plasma function to the lateral low-pressure CVD dominated in the market.

After that, the application of plasma CVD spread to the low temperature SiO_2 film deposition as well, which came to be used also as an interlayer insulating film.

At the same time, along with the expansion of TEOS (tetraethoxysilane) supply amount, plasma TEOS SiO_2 was developed, and the adoption of single wafer plasma CVD equipment advanced. In 1987, multi-chamber plasma CVD equipment was released from Applied Materials, and semi-batch equipment was released from Novellus. Although the throughput of the single wafer plasma CVD apparatus was initially low for mass production of the interlayer insulating film, market share increased quickly due to the improvement in the film formation rate.

As a result, following the low-pressure CVD equipment, the market of plasma CVD has grown into a major one, which further grew by expanding to cover gap filling technology market in the 1990s. In the 2000, plasma ALD (Atomic Layer Deposition) was also proposed.

Fig.1: 300mm single wafer plasma CVD equipment by ASM Japan

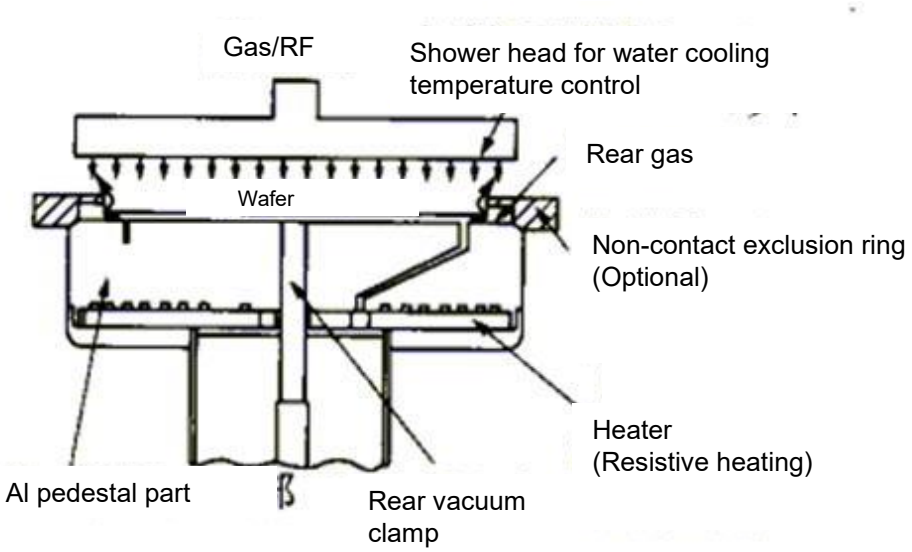

Fig.2: Structure example of plasma CVD equipment (Chamber part)

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