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Late 1970s
Low Pressure CVD (LPCVD) Equipment

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Low pressure chemical vapor deposition (LPCVD) began to be used in the manufacture of large-scale-integrated circuits since the early 1970's. It is a method of chemical vapor deposition of films under the reduced atmospheric pressure of 1/100 to 1/10000. Conventional CVD film formation was performed under atmospheric pressure (normal pressure). By reducing the pressure, the mean free path of reactant gas molecules becomes longer, resulting in much better uniformity of film thickness in and between the wafers, and also much better step coverage in the chip.
Film formation by LPCVD in semiconductor manufacturing was announced by Fujitsu in 1971. It was a method of growing a borosilicate glass (BSG) film, using a device in which a vacuum pump was attached to the horizontal diffusion furnace and the pressure was controlled by a vacuum valve. This became the basic structure of the LPCVD apparatus later.
As the integration level became higher, the necessity of film formation by the LPCVD method increased, and since the mid-1970's, LPCVD equipment for polycrystalline silicon (Poly-Si) and silicon nitride (Si_3N_4) were sold by Kokusai Electric (later Hitachi Kokusai Electric, now KOKUSAI ELECTRIC), AMI, TEL/Thermco, Unicorp, etc. . In the latter half of the 1970s, it was also applied to film formation of oxide film (SiO_2), and it became standard technique for film formation.

Figure 1 LPCVD Equipment (DJ-8300)
(provided by KOKUSAI ELECTRIC Corporation)

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