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Mid 1970s

Lithography technique moves from contact exposure to proximity exposure

~ Process Technology ~

In the contact exposure apparatus used since the 1960s, there was a problem of dust contamination of the mask caused by its close contact with photoresist. In the mid 1970's, a proximity exposure apparatus was introduced in which the mask was placed with very thin gap from the wafer to avoid this problem. In 1974, Kasper in the US released a contact exposure apparatus with a proximity function, and Canon commercialize the proximity exposure apparatus PLA-300 in the same year. When the proximity exposure apparatus PLA-500FA with automatic mask alignment function was released from Canon in 1978, the proximity lithography started to be widely used.

In the proximity exposure, since there was a gap between the mask and the wafer, the resolution was slightly lower than the contact method. However, a hard mask (a mask formed with a chromium pattern instead of a light sensitive emulsion) which provided for better pattern edge shaping, and positive resists also providing for better pattern edge definition were used, and the lithography technology was established which supported the miniaturization trend.
Import of photoresists from Shipley, Hunt, Kodak and others continued, but around this time, Japanese photoresist manufacturers such as Tokyo Ohka and Japan Synthetic Rubber (JSR) started the domestic production.

Proximity Exposure Equipment PLA-300
(By courtesy of Canon)

Proximity Exposure Equipment
with Automatic Alignment PLA-501FA
(By courtesy of Canon)

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