To search page

1990s
Chemical amplification photoresist
~ Discrete Semiconductor/Others ~

IBM had proposed a chemical amplification photoresist using a catalytic reaction in 1982. A chain reaction was caused by the active species generated by the photosensitivity reaction of one photon, and the sensitivity was greatly improved. The chemical amplification photoresist had a history of being used in Shipley's electron beam lithography resist (SAL601) and Hechist's X-ray lithography resist (RAY-RF) in the latter half of the 1980s.

In optical lithography, the wavelength of the light source was shortened from g-line (436 nm) to i-line (365 nm), and miniaturization of VLSI pattern was promoted. The light source was shifted to KrF (247 nm) in the latter half of the 1990s. However, the light transmittance of photoresist polymers decreased as the wavelength became shorter, and the output power of the lasers used for KrF light sources was small, so photoresists were required to be about ten times more sensitive than those for g-line and i-line. According to this background, chemical amplification photoresists attracted attention for optical lithography, and research and development was promoted through tangible or intangible collaborations among semiconductor device companies, photoresist companies, and photoresist material companies.

Novolac resin was used as the base for g-line and i-line photoresists, but they shifted to polyhydroxystyrene polymer for KrF photoresists, which had high permeability. Since IBM used it 1984, Nippon Soda, Maruzen Petrochemical, TOHO Chemical Industry etc. supplied high-purity semiconductor grade KrF photoresists

In this way, a chemical amplification photoresist compatible with the KrF excimer laser was put into practical use. TOKYO OHKA KOGYO developed a chemical amplification photoresist (TDUR-P015) in 1997.　It was also developed by JSR in collaboration with IBM in 2000. Coupled with the KrF excimer laser scanner launched in the late 1990s, 0.25 μm photolithography technology was established. Since then, chemical amplification photoresist technology had continued to evolve toward ArF and EUV lithography photoresist used after the 2000s.

Version 2022/5/31