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Improvement of Photoresist selectivity during etching silicon oxynitride using SF6 gas NAMGUN KIM, SUNGIL CHO, CHULHO SHIN, SANGSUP JEONG, SEOKWOO NAM, Samsung Electronics, PROCESS DEVELOPMENT TEAM — As the resolution of pattern shrinks, the etching selectivity of photoresist(PR) to inorganic films becomes critical to pattern transfer. However, the conventional fluorocarbon chemistry with O2 has the limitation to enhance the selectivity. We tried to develop the new chemistry with sulfur hexafluoride (SF6) gas for etching organic anti-reflect layer (OARC) and SiON layer. PR selectivity increased by substitution of O2 with SF6 in the conventional fluorocarbon condition, but in the same chemistry, remaining PR thickness decreased with amount of SF6. Moreover, the morphology of remaining PR was improved. The optical emission spectroscopy (OES) reveals that F radicals increase with SF6, but other radicals of carbon mono- sulfide (CS) and sulfur (S) also produced. F radical produced from SF6 etched out the OARC and SiON layer so that O2 can be replaced with SF6. To clarity the SF6 effect on the PR selectivity and morphology, we have monitored XPS and FT-IR. It was found that introduction of SF6 results in sulfur passivation of etched PR. Based on these analyses, we can conclude that S from SF6 changed the PR surface to C=S which protected the surface to erosion.

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