

Process Technology/Packaging/Assembly Technology

"Mechanism-Driven Etch-Passivation Balance Engineering for LCDU Convergence Across Hybrid EUV Geometries"

Hybrid Extreme Ultraviolet (EUV) patterns containing both wide and narrow features introduce additional complexity in pattern transfer due to feature-dependent plasma etch responses, creating simultaneous challenges in localized critical dimension uniformity (LCDU, 3σ) and pattern fidelity. In particular, narrow features inherently exhibit poorer LCDU due to their heightened sensitivity to plasma-induced critical dimension (CD) variation. In this work, the etch-passivation interactions governing differential CD evolution are investigated. These differences originate from geometry-dependent variations in ion and radical transport between wide and narrow features, leading to imbalanced pattern transfer and amplified variability at narrow dimensions. A mechanism-driven etch-passivation balance engineering strategy is developed to overcome the conventional fidelity trade-off and enable LCDU convergence across hybrid EUV geometries. The rebalanced etch-passivation improves 13% narrow-feature local uniformity and defectivity while preserving wide-feature and pattern fidelity.

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