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**Optimizing Plasma Etching of High Aspect Ratio Oxide-Nitride-Oxide Stacks**[1] SHUO HUANG, CHAD HUARD, Univ. Michigan, SANG KI NAM, SEUNGBO SHIM, WONYUP KO, Samsung Electronics, MARK J. KUSHNER, Univ. Michigan — BiCS (bit cost scalable) fabrication of semiconductor memory is now addressed by 3-dimensional structures. One of their critical fabrication challenges is the plasma etching of high aspect ratio (HAR) vias with aspect ratios (AR) up to 100 through hundreds of alternately deposited silicon oxide and silicon nitride layers. Such processing typically requires high energy (several keV) ions and carefully controlled neutral-to-ion flux ratios. With nm scale critical dimensions (CD), when high energy ions impact the surface, the etch yield (removed atoms per incident ion) can exceed unity, resulting in both higher etch rate and aggravated roughness of edges, particularly at the mask resulting in contact-edge-roughness (CER). In this paper, we report on a computational investigation of the plasma etching of oxide-nitride-oxide (ONO) stacks using the 3-dimensional Monte Carlo Feature Profile Model with a newly developed polymer mediated fluorocarbon etching mechanism for oxide and nitride. Energy and angularly resolved fluxes of ions and neutral radicals to the surface are provided by the Hybrid Plasma Equipment Model for multi-frequency capacitively coupled plasmas sustained in $Ar/O_2/C_4F_8$ mixtures. Fluxes to the etch front as a function of AR for the etching of ONO stacks, and scaling laws for maintaining CD while addressing feature distortion (e.g., twisting, CER) will be discussed

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