Abstract Submitted
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Experimental and Theoretical Investigation of Dual Frequency Magnetically Enhanced Reactive Ion Etch Plasmas ALEX PATERSON, THEODOROS PANAGOPOULOS, VALENTIN TODOROW, SHARMA PAMARTHY, Applied Materials, DECLAN SCANLAN, THORSTEN LILL, JOHN HOLLAND, Applied Materials — Dual Frequency Magnetically Enhanced Reactive Ion Etch tools (DF-MERIE) are the technology of choice for the etching of deep silicon trenches, which are required for the capacitor structures of DRAM cells. This presentation will focus on the characterization of a DF-MERIE, both experimental and theoretical, where the low and high frequencies are applied to the same wafer platen. Investigations suggest that the magnetic field produces many novel attributes to this type of etch that can not be obtained otherwise. Wafer voltage and DC bias measurements show that as the B-field increases above a certain value, dependent on frequency, the wafer voltage and DC bias decrease rapidly, becoming less negative. Inspection of the RF waveform shows that the cathodic part of the RF cycle reduces dramatically but the anodic part of the cycle increases. This suggests that sheath reversal is taking place to compensate for the electron inertia produced by the B-field, as proposed by [1].

[1] M. Kushner, J. Appl. Phys. 94/3 (2003), 1436

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