

Abstract Submitted  
for the GEC17 Meeting of  
The American Physical Society

**Cryogenic etching: A solution for damage-free narrow trench etching**<sup>1</sup> QUANZHI ZHANG, STEFAN TINCK, ANNEMIE BOGAERTS, University of Antwerp — Porous materials are commonly used in microelectronics, as they can meet the demand for continuously shrinking electronic feature dimensions. However, they are facing severe challenges in plasma etching, due to plasma induced damage. A hybrid Monte Carlo-fluid model is employed to investigate cryogenic C<sub>4</sub>F<sub>8</sub> plasma etching of porous materials. It is shown that the plasma induced damage gradually decreases with lowering the substrate temperature, which allows that C<sub>4</sub>F<sub>8</sub> condenses inside the pores. Negligible plasma induced damage can be achieved around  $-110$  C. However, the etching rate is reduced due to the pore filling with C<sub>4</sub>F<sub>8</sub>. The simulation results of both etching rate and plasma induced damage as a function of wafer temperature are validated by experimental results, performed at imec.

<sup>1</sup>We acknowledge the support from Marie Skodowska-Curie actions (Grant Agreement-702604).

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Date submitted: 31 May 2017

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