

Abstract Submitted
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Characteristics of Pulsed Capacitively Coupled Plasma Sources for Plasma Etching ANKUR AGARWAL, PHILLIP STOUT, SHAHID RAUF, KEN COLLINS, Applied Materials, Inc. — Dielectric etching of high aspect ratio features is susceptible to plasma charging damage giving less than ideal profiles. Charging damage occurs due to charge trapping on sidewall polymer. Tapering and twisting of features can also occur due to randomness in ion/radical flux composition as feature dimensions approach only a few tens of nm. While neutral beam etching and UV photon bombardment help mitigate charging damage, pulsing of a multiple frequency capacitively coupled plasma (CCP) may also allow for control of charging damage if negatively charged species can be extracted from the plasma. Pulsed plasma operation of a multiple frequency CCP reactor in electronegative etching gases is computationally investigated using coupled plasma equipment – feature scale models. Results are compared to continuous plasma operation to assess the consequences on charging of features. Careful tailoring of pulsing at both source and bias frequencies enables negative charge acceleration in the features and helps negate charge buildup. Sustaining a steady pulsed plasma can however be complicated in strongly electronegative gas mixtures as the plasma may not re-ignite after power is turned-off.

Ankur Agarwal
Applied Materials, Inc.

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