Abstract Submitted
for the GEC10 Meeting of
The American Physical Society

A Model for Effects of RF Bias Frequency and Waveform on Si Damaged-Layer Formation during Plasma Etching KOJI ERIGUCHI, YOSHINORI TAKAO, KOUICHI ONO, Kyoto University — We propose a simplified model for damaged-layer formation on Si surface induced by high-energy ion bombardment. The model is based on so-called range theory and introduces a stopping power with a power-law dependence on the incident ion energy. We applied the model to damaged-layer formation in plasma with an rf bias, by focusing on bias frequency and the waveform. The resultant ion energy distribution functions (IEDF) were considered, and the distribution profile of defect sites created by plasma was simulated. We found that, owing to the characteristic stopping power and the straggling (i.e., stochastic effects), the impacts of bias frequency and the waveform were subject to suppression, i.e., the thickness of the damaged layer is a weak function of bias configuration. These predicted features were compared with experimental data using an inductively coupled plasma reactor with two different bias frequencies; 13.56 MHz and 400 kHz. The model prediction showed good agreement with experimental data.

Koji Eriguchi
Kyoto University

Date submitted: 11 Jun 2010 Electronic form version 1.4