

Abstract Submitted  
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**Selective Etching by Tailored RF Ion Energy Control Using Frequency/Phase Locked RF Power Delivery** YUSUKE YOSHIDA, TEL Technology Center, America, LLC, DAVID COUMOU, SCOTT WHITE, MKS Instruments, Inc., STEVEN SHANNON, Nuclear Engineering Department, North Carolina State University, SERGEY VORONIN, TEL Technology Center, America, LLC, ALOK RANJAN, Tokyo Electron Miyagi, Ltd. — The control of the ion energy distribution function (IEDF) for surface interaction remains a vexing challenge for semiconductor process engineers. Exploiting frequency and phase locked RF power delivery for sheath voltage manipulation presents a unique method for ion energy control. By regulating the skew of the ion energy distribution, we achieve improved fidelity of etch rate control. Experimental sputtering and etch yields for oxide and nitride films are obtained from measured IEDFs and etch rate data. By tailoring the ion energy peak location and the overall shape of the IEDF, we preferentially “delegate” more ions to the optimal ion energy group while minimizing the surface material impingement of other energy bands. This ability to customize IEDFs yields a process enhancement for precise material removal compared to conventional techniques, offering a great potential for etch applications at atomic scale (say ALE) processes.

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