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Measurement of aspect ratio dependent ion energy distribution functions with a retarding field energy analyzer in RF biased plasmas YUHUA XIAO, YAO DU, STEVEN SHANNON, North Carolina State University — The control of ion energy and angular distributions (IEADs) is critically important for etching of high aspect ratio (AR) structures because the velocity vector of ions is not always perpendicular to the wafer surface. The off-normal ions are mainly a result from thermal motion, collisions during transiting across sheath, and charging effects. In this work, we measure the ion energy distribution function (IEDF) in a 13.56 MHz driven capacitively biased plasma reactor coupled to VHF or ICP driven systems for independent control of plasma density. IEDF's are measured using a commercial retarding field energy analyzer (RFEA) mounted on the biased electrode (Impedans Vertex RFEA). RFEA results are combined with hairpin probe, Langmuir probe, and OES measurements to elucidate processes that impact ion energy spectra for high aspect ratio processes. The results are further compared to fluid model and particle-in-cell (PIC) simulations.

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