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Spatial and temporal structure of a sheath formed in a 300 mm, dual-frequency capacitive argon discharge ED BARNAT, PAUL MILLER, GREG HEBNER, Sandia National Laboratories, ALEX PATERSON, JOHN HOLLAND, Applied Materials — The spatial and temporal distributions of the electric fields of a sheath formed by a dual-frequency driven capacitive argon discharge are measured as functions of relative mixing between a low frequency current (13.56 MHz) and high frequency current (67.8 MHz). This is the first time a Stark effect based technique has been employed to measure sheaths of this nature. We find that for a given total input power, as the high frequency power increases, both the total voltage across the sheath and the thickness of the sheath decreases. We also find that the temporal evolution of the potential across the sheath as well as the sheath thickness contain both rf components and that the high frequency oscillations become more prominent with increased high frequency power. For insight, comparisons of the measured spatial and temporal profiles are made to computational models commonly employed in the literature. These models include the collisional rf sheath model of Lieberman and extended to dual frequencies by Robiche et. al. Where possible, we compare on our measured trends to those predicted by the models, which in general, show good agreement.

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