

Abstract Submitted
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Student Excellence Award Finalist: Double layers at anode spots in low-pressure plasma¹ SCOTT BAALRUD, NOAH HERSHKOWITZ, Engineering Physics Department, University of Wisconsin-Madison — The evolution of the potential profile near an electrode with positive applied potential has three distinct modes. For bias less than the ionization potential of the neutral gas, a monotonic electron sheath is present. When the applied bias is increased beyond the ionization potential, a thin region of increased ionization and a corresponding double layer (DL) form near the electrode. This regime is referred to as anode glow. When the ion density in the anode glow becomes large enough that there are many ions in a Debye sphere, a quasineutral anode spot (AS) forms and the DL moves many Debye lengths away from the electrode. The distance between electrode and DL can be calculated using current balance conditions, Bohm's criterion, and quasineutrality in the AS. For small electrodes, the AS diameter is typically larger than the electrode and the AS appears approximately spherical. However, for large electrodes the AS diameter can be much shorter than the electrode diameter and the AS is more akin to a cylinder with length longer than diameter. AS and electrode diameters are correlated. Data were taken in a multidipole chamber with mTorr range argon plasma generated by hot filaments.

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