

Electronic Supplementary Information (ESI)

A Transmission-Type Triple Grating Spectrograph for Improved Laser Scattering Diagnostics of Low-Density Plasmas used in Chemical Analysis

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This material includes supplemental information to the primary manuscript.

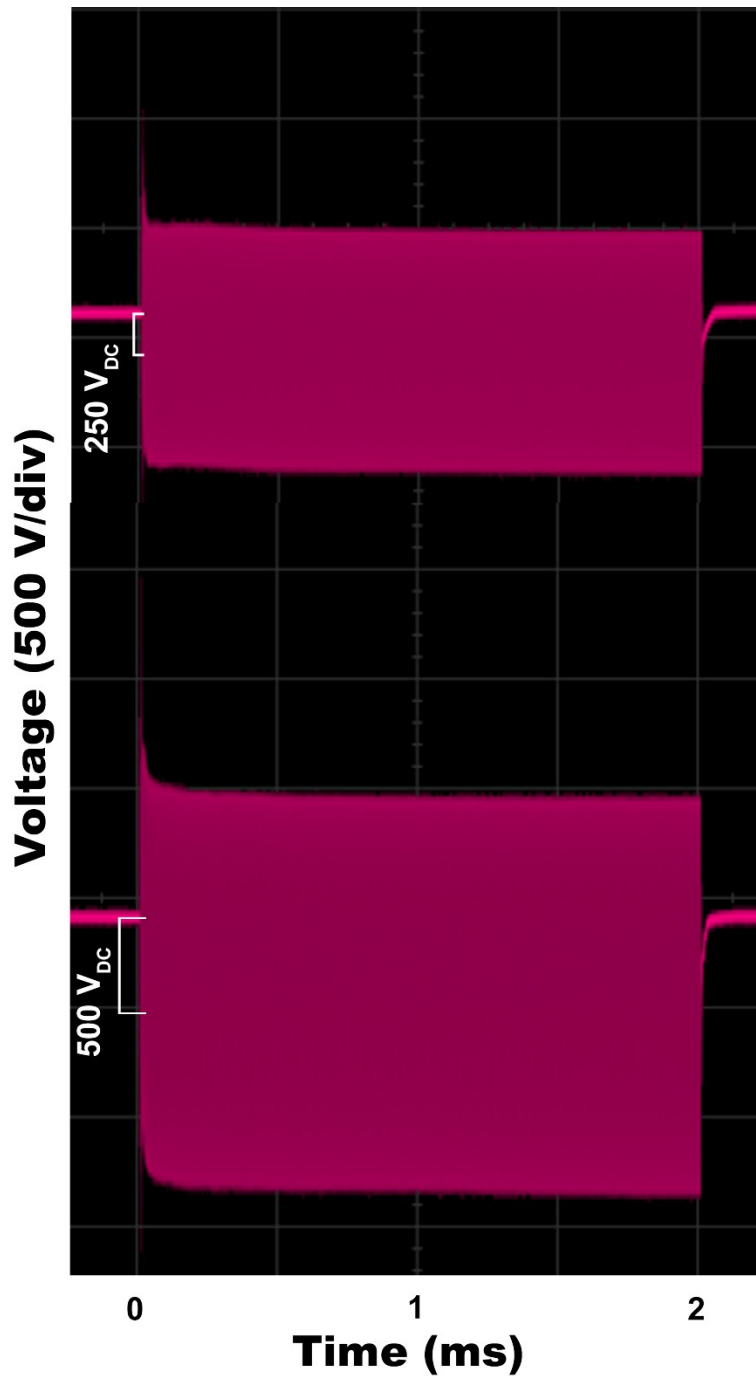


Figure SF1. Oscilloscope traces measured at the cathode, showing the DC self-bias developing for both 250 and 500 V cases. RF pulse conditions are: 2 ms width, 13.56 MHz, 20% duty cycle, (top) 250 V_{dc} self-bias, 450 W forward power, 115 W reflected power (bottom) 500 V_{dc} self-bias, 800 W forward power, 250 W reflected power.

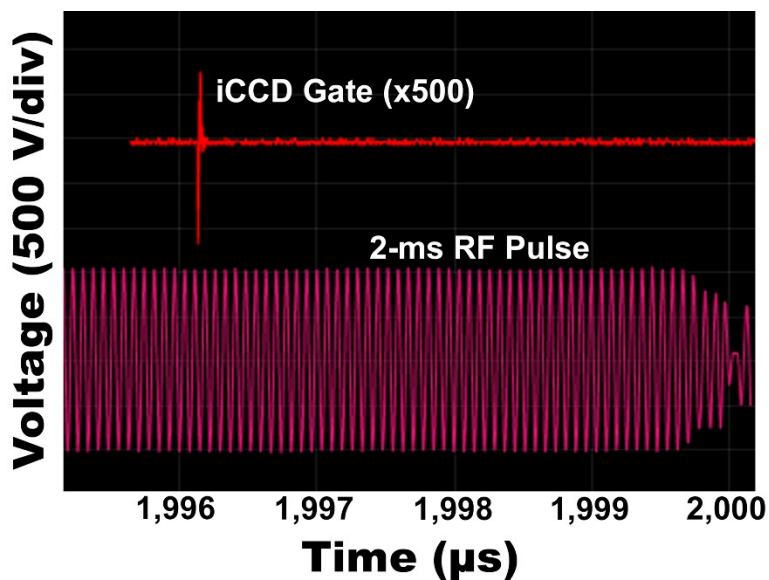


Figure SF2. Oscilloscope traces showing the synchronization of the iCCD gate at 4 μs before the end of the, 2-ms RF pulse. RF pulse conditions are: 2 ms width, 13.56 MHz, 20% duty cycle, 800 W forward power, 250 W reflected power.

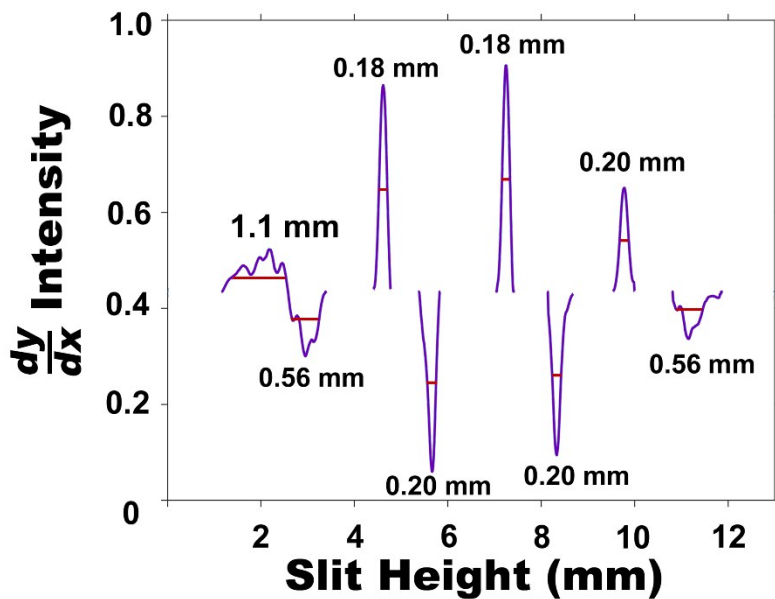


Figure SF3. Line spread function at 532 nm. The FWHM of the 1st derivative of the intensity profile at each edge (value at top and red line across each peak, cf. Fig. 2B) shows the spatial resolution.

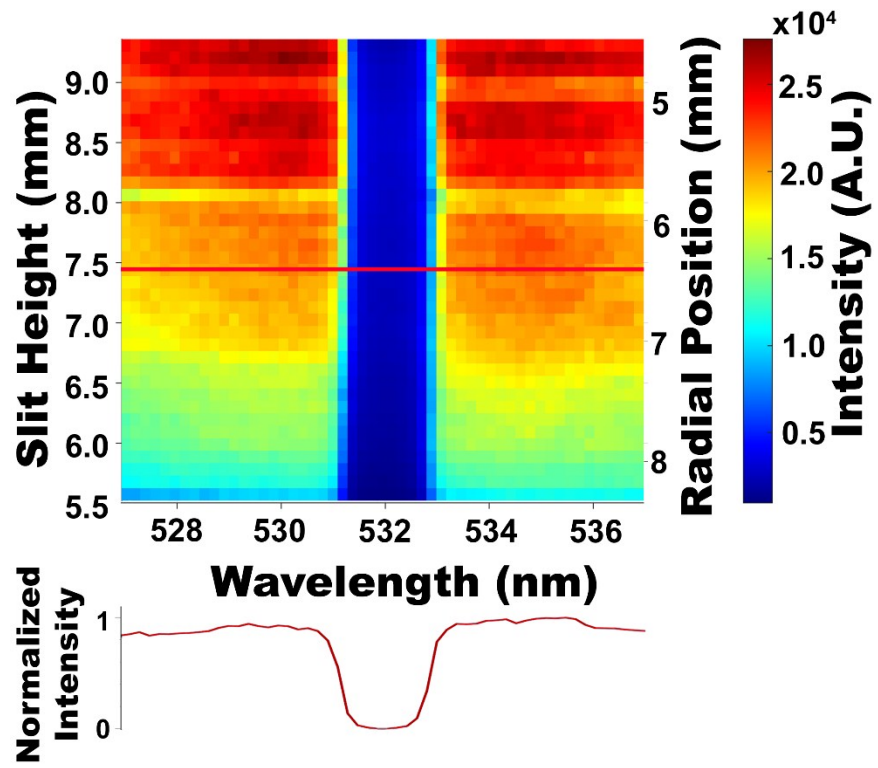


Figure SF4. LED ring lamp flatfield image taken at the center of the GD chamber, along the laser axis. Dark vertical region around 532 nm shows the orientation of the TGS physical mask. Radial position of 0 is the axis of plasma.

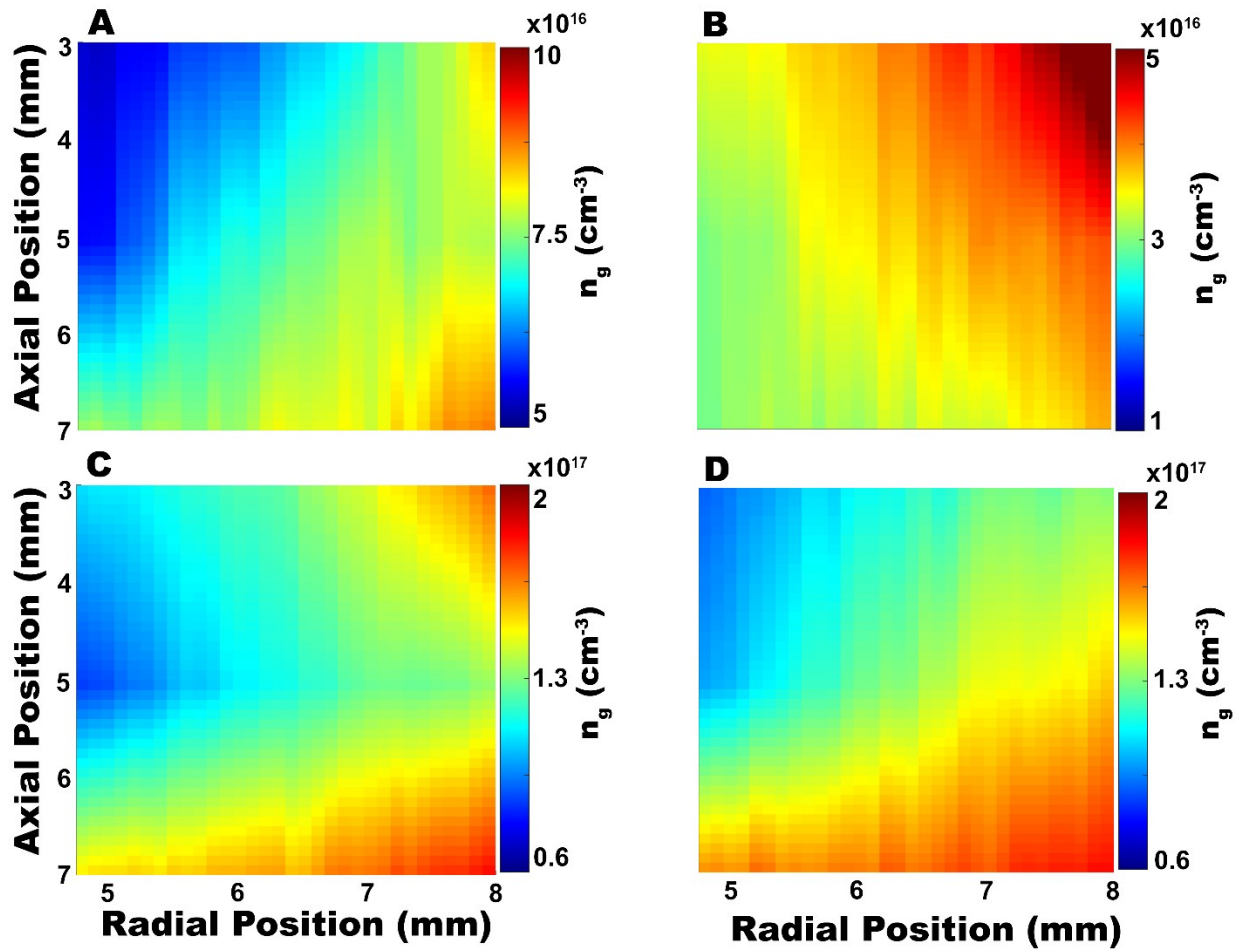


Figure SF5. Ar gas number density (n_g) maps at the edge of the negative glow region: 3.10 Torr, (A) 450 V, 10 mA, 0.047 W/mm^2 , (B) 800 V, 30 mA, 0.25 W/mm^2 ; and 7.20 Torr, (C) 450 V, 10 mA, 0.047 W/mm^2 (B) 800 V, 30 mA, 0.25 W/mm^2 . Axial position 0 is defined as the cathode surface and radial position of 0 is the axis of plasma. Note that each image has a colormap scale normalized to its own maximum n_g .