Abstract Submitted
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Oxygen atom and negative ion densities and kinetics by cavity ringdown spectroscopy[1] JEAN-PAUL BOOTH, ABHYUDAY CHATTERJEE, OLIVIER GUAITELLA, LPP-CNRS, Ecole Polytechnique, Palaiseau, France, SERGEY ZYRYANOV, DMITRY LOPAEV, TATYANA RAKHIMOVA, Moscow State University, GRANT RITCHIE, PCTL, Oxford University — Accurate absolute density and kinetic measurements of oxygen atoms and negative ions are necessary for rigorous testing of oxygen plasma models. We have developed cavity ringdown spectroscopy of the forbidden ^{1}D-^{3}P transition at 630nm using an external cavity tuneable diode laser, and used it to measure oxygen atom densities and translational temperatures (from the Doppler profile) in DC positive column discharges as a function of O_2 pressure (0.5-7 Torr) and current (10-40 mA). We also developed time-resolved CRDS in (partial and full) modulated discharges, allowing the loss kinetics to be investigated and showing dramatic differences in the loss mechanisms between the discharge and the afterglow. We were also able to observe the weak photodetachment continuum absorption of O^- negative ions, The negative ion density is minimal when the O atom mole fraction is highest, confirming that associative detachment is the dominant loss mechanism.

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