Abstract Submitted
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Development of low-pressure oxygen discharge emission model for electron temperature determination[1] JESSICA PACHICANO, JOHN B. BOFFARD, CHUN C. LIN, AMY WENDT, University of Wisconsin - Madison — The development of an oxygen emission model is motivated by interest in non-invasive diagnostics based on optical emission spectroscopy (OES) to determine plasma properties, including electron temperature, T_e. Model development for O and O_2^+ emission intensities includes experimental (OES, multipole resonance probe, Langmuir probe) determination of T_e-dependent rate constants for collisional electronic excitation of O_2^+ from the ion ground state as well as parameters to quantify electron quenching of emitting states. Excitation and quenching parameters for the O_2^+ first (FNS) and second (SNS) negative system bands have been determined by fitting emission intensities as a function of electron density using inductively coupled plasma (ICP) measurements recorded for a range of pressures (2.5-30 mTorr) and RF powers (100-2000 W). A comparison of fit results for a FNS band based on Maxwellian and "depleted tail" electron energy distribution functions (EEDF) will be presented. Including the weaker O_2^+ SNS emissions will enhance the ability of the completed model to resolve the EEDF using OES alone since the functional dependences of their intensities on plasma conditions exhibit different trends compared to those of the stronger FNS bands.

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Amy Wendt
University of Wisconsin - Madison

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