

Abstract Submitted  
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**Study of atmospheric air AC glow discharge using optical emission spectroscopy and near infrared diode laser cavity ringdown spectroscopy**<sup>1</sup> NIMISHA SRIVASTAVA, CHUJI WANG, Mississippi State University, Starkville, MS, THEODORE S. DIBBLE, State University of New York, Syracuse, NY — AC glow discharges were generated in atmospheric pressure by applying high voltage AC in the range of 3500-15000 V to a pair of stainless steel electrodes separated by an air gap. The discharges were characterized by optical emission spectroscopy (OES) and continuous wave cavity ringdown spectroscopy (cw-CRDS). The electronic ( $T_{ex}$ ), vibrational ( $T_v$ ), and rotational ( $T_r$ ) temperatures were measured. Spectral stimulations of the emission spectra of several vibronic bands of the 2<sup>nd</sup> positive system of N<sub>2</sub>, the 1<sup>st</sup> negative system of N<sub>2</sub><sup>+</sup>, the (0,1,2,3-0) bands of NO (A-X), and the (0-0) band of OH (A-X), which were obtained under various plasma operating conditions, show that  $T_r$ ,  $T_v$ , and  $T_{ex}$  are in the ranges of 2000 - 3800, 3500 - 5000, and 6000 - 10500K, respectively. Emission spectra show that OH concentration increases while NO concentration decreases with an increase of electrode spacing. The absorption spectra of H<sub>2</sub>O and OH overtone in the near infrared (NIR) were measured by the cw-CRDS with a telecommunications diode laser at wavelength near 1515 nm.

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