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CARBON NANOTUBES AS ELECTRON EMITTERS TO GENERATE PLASMA IN AIR AND AIR/GAS MIXTURES NAZIEH MASOUD, Milwaukee School of Engineering, Milwaukee WI, KEVIN MARTUS, William Paterson University, Wayne NJ, DANIEL MURNICK, Rutgers University, Newark NJ — A plasma source using a 10kV electron beam generated from a carbon Nanotube (CNT) was developed to produce plasmas in air or in air/gas mixtures. The CNT is located in a small low-pressure (10-6 mbar) cell with a 300 nm thick SiNx window to transmit the electrons to the high pressure plasma region. The source was operated with ambient air or with Argon (Ar) or Helium (He) gas flow across the SiNx window forming an air/gas mixture. Emission spectroscopy revealed a variation of species that was dependent on the electron beam energy and the gas flow conditions (type of gas, flow rate, and location of gas source relative to the SiNx window). OH line at 310 nm was found only with an Ar gas flow, whereas, the He flow yielded an N2+ emission at 391 nm. Spatial distribution studies indicated that the thickness of the generated plasma plume reached about 4 mm (2 mm) when He (Ar) gas is flowed on the SiNx window, and 3 mm with air alone. Plasma reactive species were found in the region outside of visible plasma plume (afterglow). When the gas flowed from a source 2.0 cm in front of the SiNx window, the volume of plasma extended from the surface of SiNx window to the gas source. Species throughout the plasma length change between the surface of the SiNx window to the source of the gas.

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