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Effect of Addition of Water Vapor on OH Radical Concentration in an Atmospheric Pressure Microwave Argon Plasma Jet[1] NIMISHA SRIVASTAVA, CHUJI WANG, Mississippi State University, MS, STERLING HARPER, Mississippi School for Mathematics and Science, Columbus, MS — In recent years, role of reactive plasma species such as OH and O in various plasma treatments and combustion applications are topics of investigation and debate. Quantitative study of OH radicals in atmospheric plasma jets can contribute to the better understanding of OH generation mechanism and to optimization of plasma treatment processing and plasma source designs. A 2.45 GHz microwave plasma source was used to study the effect on OH radical generation in an argon atmospheric pressure plasma jet with addition of H_2O vapor. OH radical number densities were measured along the plasma jet axis using UV cavity ringdown spectroscopy of OH (A–X) (1 – 0) band at 308 nm. Addition of water vapor results in reduction of plasma column jet length and increases gas temperature. Optical emission spectroscopy clearly shows that dominant reactive species in pure Ar plasma jet changed from N_2 to OH with the addition of water vapor. The absolute number densities of OH varied along the jet axis from 7.4×10^{14} to 3.7×10^{16}, 4.3×10^{14} to 5.0×10^{16}, and 4.6×10^{14} to 3.4×10^{16} molecule/cm^3 for the addition of 0 ppm, 4 ppm, and 7 ppm water vapor, respectively.

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