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Optical Emission Spectroscopy Characterization of Atmospheric Pressure Plasma Removal of High Density Polyethylene¹ ANTHONY MCWILLIAMS, STEVEN SHANNON, STEPHEN HUDAK, JERRY CUOMO, North Carolina State University — Detailed spectroscopic measurements have been made on a hybrid vortex stabilized plasma torch probing the removal of high density polyethylene (HDPE). It has been determined that the dominant removal mechanism is related to the emission intensity of the reactive species present in the plasma through correlating the intensity of the atomic oxygen 777 nm peak with the removal rate as a function of axial distance from the torch. The studies also determined a weak correlation between removal rate and temperature. Further investigation of the removal mechanism has been based on *in situ* OES measurements of the plasma etching HDPE. This enables the comparison of the emission from available plasma reactants to the emission from the products resulting from either direct emission during the reaction phase or indirect reincorporation into the plasma region. Knowledge of the initial reactants and final products permits the formation of a hypothesis on the actual dominant removal mechanism or reaction pathway.

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