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**Influence of $Ar/O_2/H_2O$ Feedgas AND $N_2/O_2/H_2O$ Environment on the Interaction of Time Modulated MHz Atmospheric Pressure Plasma Jet (APPJ) with Model Polymers**[1] GOTTLIEB OEHRLEIN, PING-SHAN LUAN, ANDREW KNOLL, University of Maryland, SANTOSH KONDETI, PETER BRUGGEMAN, University of Minnesota — An $Ar/O_2/H_2O$ fed time modulated MHz atmospheric pressure plasma jet (APPJ) in a sealed chamber was used to study plasma interaction with model polymers (polystyrene, poly-methyl methacrylate, etc.). The amount of $H_2O$ in the feed gas and/or present in the $N_2$, $O_2$, or $N_2/O_2$ environment was controlled. Short lived species such as O atoms and OH radicals play a crucial role in polymer etching and surface modifications (obtained from X-ray photoelectron spectroscopy of treated polymers without additional atmospheric exposure). Polymer etching depth for Ar/air fed APPJ mirrors the decay of gas phase O atoms with distance from the APPJ nozzle in air and is consistent with the estimated O atom flux at the polymer surface. Furthermore, whereas separate $O_2$ or $H_2O$ admixture to Ar enhances polymer etching, simultaneous addition of $O_2$ and $H_2O$ to Ar quenches polymer etching. This can be explained by the mutual quenching of O with OH, H and $HO_2$ in the gas phase. Results where $O_2$ and/or $H_2O$ in the environment were varied are consistent with these mechanisms. All results will be compared with measured and simulated species densities reported in the literature.

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Gottlieb Oehrlein
University of Maryland

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