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Electrode Configurations in Atmospheric Pressure Plasma Jets[1]
AMANDA M. LIETZ, MARK J. KUSHNER, University of Michigan — Atmospheric pressure plasma jets (APPJs) are being studied for emerging medical applications including cancer treatment and wound healing. APPJs typically consist of a dielectric tube through which a rare gas flows, sometimes with an O_2 or H_2O impurity. In this paper, we present results from a computational study of APPJs using *nonPDPSIM*, a 2-D plasma hydrodynamics model, with the goal of providing insights on how the placement of electrodes can influence the production of reactive species. Gas consisting of He/O_2 =99.5/0.5 is flowed through a capillary tube at 2 slpm into humid air, and a pulsed DC voltage is applied. An APPJ with two external ring electrodes will be compared with one having a powered electrode inside and a ground electrode on the outside. The consequences on ionization wave propagation and the production of reactive oxygen and nitrogen species (RONS) will be discussed. Changing the electrode configuration can concentrate the power deposition in volumes having different gas composition, resulting in different RONS production. An internal electrode can result in increased production of NO_x and HNO_x by increasing propagation of the ionization wave through the He dominated plume to outside of the tube where humid air is diffusing into the plume.

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