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Air Plasma Generation with an Electrically Conductive Liquid Column Jet¹ KEISUKE TAKASHIMA, KENJI NIHEI, TOSHIRO KANEKO, Grad. School of Eng., Tohoku University — For the plasma agricultural application, a liquid jet spray through an air plasma has been developed. An electrically conductive water solution jet with KNO_3 is injected into a discharge domain and utilized as the grounded electrode to generate the plasma. This realizes significant power loading to the gas-liquid interface plasma and the plasma exposed liquid column jet collapses into droplets. Liquid phase reactive oxygen and nitrogen species (RONS_{aq}) and the gas phase RONS_{gas} are experimentally characterized by reagent test kits and FTIR, respectively. The experimental characterization on the OH_{aq} production indicates that most of OH_{aq} can be generated near the liquid surface. The gas-liquid interface reactions can be significantly modulated by the liquid flow rate, inferred from the measured gas phase RONS_{gas} composition. Conidium suspension liquid droplets are sprayed by the plasma exposed solution to evaluate the antibacterial effect of the plasma exposed solution. The generated $\text{NO}_{2\text{gas}}$ density founds to be well related to the conidium germination suppression effect under a similar OH_{aq} generation. Therefore, the gas-liquid interface reactions generating RONS are considered to play an important role on suppressing the conidium germination.

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