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Reactive species profile in an atmospheric pressure plasma jet ignited in He and He/O2 mixture – implications for surface sterilization KRISHNA PRIYA ARJUNAN, BRENDAN JONES, SYLWIA PTASINSKA, Radiation Laboratory, University of Notre Dame — The enhanced chemistry and low temperature of cold atmospheric plasma (CAP) makes it a promising alternative to conventional sterilization techniques. Of the various configurations used for generating cold plasma, atmospheric pressure plasma jets (APPJs) are particularly interesting for biomedical applications since they can be used for targeted treatment of intricate geometries such as catheters due to their small dimensions. The present study shows the efficacy of an APPJ ignited in helium or He/O2 mixture in inactivating *Escherichia coli* (*E.coli*) bacterium on agar plate. To study the dependence of helium flow rate and sample distance on the inactivation area, *E.coli* spread on agar was treated for 10 min at various combinations of helium flow rates and sample distances from the nozzle. A ring-shaped inactivation area was observed in samples treated close to the jet nozzle. Addition of O2 significantly increased the inactivation area. The ring shaped inactivation area observed with only helium feed gas vanished with oxygen addition. The optical emission spectra of the core and jet region of the APPJ in helium and He/O2 were obtained. The profile of H2O2, NO2-, NO3- and O3 reaching the sample were determined using test strips arranged in a 3x3 array. A ring-shaped profile was observed for these species in samples treated close to the nozzle with helium APPJ, while no ring-shaped profile was observed with O2 addition. Addition of O2 increased O3 levels, and was detected up to 3 cm in the radial direction.

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