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A Nanosecond Pulsed Plasma Brush for Surface Decontamination JOHANNA NEUBER[1], Old Dominion Univ, MUHAMMAD MALIK, Frank Reidy Research Center for Bioelectrics, SHUTONG SONG[2], CHUNQI JIANG[3], Old Dominion Univ — This work optimizes a non-thermal, atmospheric pressure plasma brush for surface decontamination. The generated plasma plumes with a maximum length of 2 cm are arranged in a 5 cm long, brush-like array. The plasma was generated in ambient air with $\leq$ 10 kV, 200 ns pulses at a repetition rate of 1.5 kHz. The energy per pulse and average power are in the range of 1-3 mJ and 0.5-1.5 W, respectively. Helium containing varying concentrations of water vapor was evaluated as the carrier gas and was fed into the plasma chamber at a rate varying between 1 to 7 SLPM. Optimization of the cold plasma brush for surface decontamination was tested in a study of the plasma inactivation of two common pathogens, Staphylococcus aureus and Acinetobacter baumannii. Laminate surfaces inoculated with over-night cultured bacteria were subject to the plasma treatment for varying water concentrations in He, flow rates and discharge voltages. It was found that increasing the water content of the feed gas greatly enhanced the bactericidal effect. Emission spectroscopy was performed to identify the reactive plasma species that contribute to this variation.

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