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Biological and Chemical Evaluation of Biocidal Plasma Jets[1]
KARL STEPHAN, Ingram School of Engineering, Texas State University, ROBERT MCLEAN, Department of Biology, Texas State University, GIAN DELEON, VADIM MELNIKOV, Ingram School of Engineering, Texas State University —
Plasma jets that produce "cold" plasma can disinfect or sterilize surfaces without the need for elevated temperatures or aggressive liquid chemical treatment. The active ingredients in most cold plasmas are reactive oxygen species (ROS) such as singlet oxygen, OH, and hydrogen peroxide. While many studies of plasma jets for biological applications have been published, there is a need to develop a quantitative measure of the plasma's biological activity that is simpler than testing the jet with biological samples. In this paper, we study a simple method developed to evaluate a plasma jet's ability to cause oxidative stress to biological targets. The method uses a ferrous-oxidation-xylenol-orange chemical indicator to quantify the presence of ROS, which is then correlated with measurements of the plasma jet's biological activity. The physical chemistry of the plasma-to-solution transfer process can be modeled and correlated with bacterial survival data. Our long-term objective is to refine this antimicrobial technology for applications on a number of surfaces.

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Karl Stephan
Ingram School of Engineering, Texas State University

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