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Cold plasma needle-activated ROS in liquid for cancer cell inactivation[1] CHUNQI JIANG, Center for Bioelectrics Department of Electrical and Computer Engineering, Old Dominion University, ESIN B. SOZER, Center for Bioelectrics, Old Dominion University, SHUTONG SONG, Center for Bioelectrics Department of Electrical and Computer Engineering, Old Dominion University, NICOLA LAI, Department of Electrical and Computer Engineering, Old Dominion University, SIQI GUO, P. THOMAS VERNIER, Center for Bioelectrics, Old Dominion University, CBE PLASMA PULSED POWER LAB COLLABORATION, CBE BIOLOGY IMMUNOLOGY COLLABORATION, BME COLLABORATION
— Reactive oxygen and nitrogen species generated by atmospheric pressure, non-equilibrium plasmas in contact with liquid have been considered highly important agents in plasma medicine applications including bacterial disinfection, wound healing and cancer treatment. We report here measurements of ROS including hydroxyl radical and hydrogen peroxide in liquid exposed to nanosecond pulsed helium plasma jets in ambient air. The plasma was generated by a single needle powered by repetitive nanosecond multi-kilovolt pulses. OH radicals were measured in water as well as in biological media. Cancer cell lines including pancreatic and histiocytic lymphoma U-937 cells in suspension were inactivated after exposure to the plasma needle for less than one minute. Dependence of cell inactivation on the OH production in liquid is discussed.

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