

# Non-thermal Plasma-Induced Free Radical Effluent with Hydrogen Peroxide Additives

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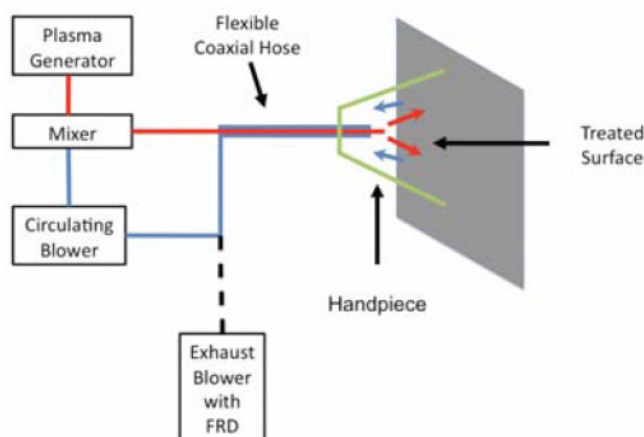
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A plasma medicine technology comprised of dielectric barrier discharge and hydrogen peroxide additives has been shown to be effective in deactivating pathogens on time scales of tens of seconds even though it involves the so called “indirect” exposure technique. *In vitro* deactivation tests of gram negative bacteria (*Pseudomonas aeruginosa*), gram positive bacteria (*Staphylococcus aureus*), bacteria spores (*Bacillus atrophaes*) and biofilms (*Escherichia coli*) have been performed. Optical frequency comb spectroscopy shows the detection of free radicals and other chemical species including O<sub>3</sub>, H<sub>2</sub>O<sub>2</sub>, N<sub>2</sub>O, and NO<sub>2</sub> with evidence of OH· radical production through surface reactions and secondary chemical dynamics. Histology performed on murine skin exposed to the plasma induced effluent does not show adverse affects and compares favorably with alcohol and Silvadene treatments that are currently the mainstays of live tissue disinfection. The technology has been implemented in a new device that allows for application of the effluent to porcine wound healing models and can be used as a bedside burn wound treatment (Figure 1). We use an established porcine burn injury model inoculated with both *Staphylococcus aureus* and *Pseudomonas aeruginosa* to compare prevention of burn wound infection and burn wound sterilization to standard-of-care topical treatments.

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**Figure 1:** Schematic of representation of non-thermal plasma-induced free radical delivery system