Non-thermal Plasma Infection Control

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Background

Global Factors Promoting Spread of Infectious Disease
- globalization: rapid movement of people, food, microbes
- explosive population growth, rise of large cities, coupled with poverty, urban migration and limited public health facilities
- intensive/concentrated livestock industry
- global climate change disrupting ecosystems
- antimicrobial resistance: inexorable rise in number of resistant microbes limits use of traditional infection control (e.g. antibiotics)
- emerging threat of bioterrorism

Hospital-Acquired Infections ('Nosocomial' Infections)
- catheter-associated urinary tract infections
- catheter-related bloodstream infections
- surgical site infections
- ventilator-associated pneumonia
- prion and biomolecule infections

Possible non-thermal plasma devices for infection control

Helium plasma needle
- Function generator: Protek 9361
- RF amplifier: EIN Model 240L
- 1-5 mm He flow
- 13.56 MHz, ~1 W
- Matching box

Air DBD
- Corona-like plasma

Microplasmas in solution

Concluding remarks
- The challenge is huge. Antibiotic resistance and hospital-acquired infections, coupled with other infectious disease problems worldwide: infection control is imperative!
- ROS and RNS are central players in the body’s defense against ID agents as well as playing other key biochemical roles.
- Atmospheric pressure, low temperature plasmas are prolific, inexpensive, and simple generators of ROS and RNS.
- The opportunity is clear for plasma-assisted infection control: chemistry that mimics the innate immune system can be used on/near body

References