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**Dynamical-Behavior Characterization of Atmospheric-Pressure
Dielectric-Barrier-Discharge Plasma Jets for Control of Reactive Oxygen and
Nitrogen Species in Liquid**

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Non-equilibrium atmospheric-pressure plasmas have attracted great interests as effective tools for materials processing and medical treatments. Especially, applications in medical treatments have been extensively investigated worldwide as a new scientific field "plasma medicine" due to significant medical effects including cancer therapy. For development of innovative science and technologies for a variety of applications, it is of great significance to understand basic characteristics in terms of dynamical behaviors and interactions with substances including solid materials and liquid. So far we have carried out a series of investigations on frequency dependence of atmospheric-pressure discharge generation in a wide range of discharge-power frequency from kHz region with high-voltage DC pulses to VHF.

In this presentation, these studies are extended further to investigation of dynamical-behavior characterizations and plasma interactions with liquid for controlling reactive oxygen species (ROS) and reactive nitrogen species (RNS) in liquid, as key parameters in medical treatments as well as in advanced materials processing through plasma-activated liquids. Atmospheric-pressure dielectric-barrier discharge plasma jets have been investigated using an intensified CCD (ICCD) camera. The fluid dynamic behaviors of the plasma jet have further been studied using Schlieren method for investigation of the gas-flow effects on discharge and correlation of with radical formation in liquid. Furthermore, dynamical behaviors of the plasma jet have been studied via electrical characterizations of the plasma-jet propagations for explicit evaluations of plasma states in the vicinity of liquid surface.

Keywords

non-equilibrium atmospheric-pressure plasma
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reactive nitrogen species (RNS)
plasma medicine