

# Technical Meeting on Emerging Applications of Plasma Science and Technology

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## Adaptive Plasmas for Biomedical Applications

*Wednesday, 20 September 2023 09:00 (30 minutes)*

The uniqueness of low-temperature plasma is in its ability to change composition in situ. Plasma self-organization could lead to formation of coherent plasma structures. These coherent structures tend to modulate plasma chemistry and composition, including reactive species, the electric field and charged particles. Formation of coherent plasma structures allows the plasma to adapt to external boundary conditions, such as different cells types and their contextual tissues. In this talk we will explore possibilities and opportunities that the adaptive plasma therapeutic system might offer. We shall define such an adaptive system as a plasma device that is able to adjust the plasma composition to obtain optimal desirable outcomes through its interaction with cells and tissues.

Various approaches for plasma therapy based on plasma adaptation to target conditions will be reviewed. These approaches are based on the ability of measuring the cellular response to plasma immediately after treatment and modifying the composition and power of plasma via a feedback mechanism. Plasma self-adaptation might be feasible due to self-organization and pattern formation when plasma interacts with targets. Plasma effect on biological targets is influenced by various factors including the plasma jet discharge voltage, gas composition, humidity and cancer cell type. To address this, we present an optimal feedback control scheme to adjust treatment conditions responsive to the biological response.

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