PPPS 2019



Contribution ID: 775

Type: Either

Feedback from cells: how cancer cells could make cold atmospheric plasma jet selective during treatment

Monday 24 June 2019 09:45 (30 minutes)

Currently, the plasma-based cancer treatment and the mechanism of plasma jet interacts with the target are hot topics. During the cell treatment, the cell feedback makes plasma jet inconsistent among different type of cells even with all other setups are the same. Therefore, such cell feedback on plasma jet cannot be neglected. In this work, we discovered how cancer cells change the plasma parameters at steady state during in-vitro treatments. Comparing with MDA-MB-231 (breast adenocarcinoma), PA-TU-8988T (pancreatic adenocarcinoma), and U87MG (glioblastoma), B16F10 (murine melanoma) make the lowest electron density in the helium plasma jet. When the jet is pointing at the edge of the cell colony, B16 also makes the most asymmetric self-organization patterns. Capacitance imaging of cell colonies indicates that the capacitance of the B16 colony is the highest one among these cell lines and also the permittivity. A finite element study of target permittivity shows that a dielectric target without ground electrode behind can decrease the electric field of streamer head in plasma jet when the permittivity is high. This agrees with the observation of this work. However, a dielectric target with a ground electrode behind results in an opposite permittivity effect which agrees with the previous simulations. The observation of this work reveals how the cancer cells can change the plasma jet due to their permittivity, which helps to determine the selectivity of plasma treatment.

Authors: LIN, Li (The George Washington University); YAN, Dayun (The George Washington University); KEI-DAR, Michael (George washington University)

Presenter: LIN, Li (The George Washington University)

Session Classification: 6.5 Biological and Medical Applications I

Track Classification: 6.5 Medical and Biological Applications