Contribution ID: **1311** Type: **Poster**

3P11 - Temporal Gas Temperature Measurement of Single Filament in Atmospheric Pressure Plasma Jet

Wednesday 26 June 2019 13:30 (1h 30m)

The gas temperature is an important plasma parameter as it strongly influences the plasma chemistry which drives most plasma applications. The gas temperature in non-equilibrium plasmas is often obtained by fitting the synthetic spectrum to the experimental spectrum of the C3Πu-B3Πg (△v=-2) band transition of nitrogen. However, the gas temperature obtained by this method is actually the average gas temperature of APPJ during the spectral acquisition, that is, the cumulative effect of temperature, and the error of the method is usually at ten degrees or even higher. For some plasma medical applications, ten degrees may exert different biological effect. As the discharge mode of APPJ is mostly like a pulse discharge and the minimum discharge duration is about ten nanoseconds, the gas temperature may decrease from a higher temperature after the discharge process. Therefore, the temperature perceived by the human body is likely to be different from the instantaneous gas temperature of APPJ. Whether relatively high temperature produced by APPJ has a biomedical effect on cells, tissues, etc. remains to be studied.
This work presented temporal gas temperature when DC air discharge was applied to the skin by a statistical way. The accuracy of the gas temperature and time resolution were on the order of K and μs, respectively. It was found that the gas temperature is highest at the peak value of discharge current. Then, the gas temperature rapidly decreased within 5 μs, and after 40 μs, the gas temperature returned to room temperature. When applied voltage was decreased, the peak value of gas temperature was not significantly changed, but the rate of change in gas temperature was become smaller. In other words, the gas temperature decreased more slowly and returned to room temperature later.

Authors: LI, Jiayin (Huazhong University of Science and Technology); Dr WU, Fan; Prof. LU, Xinpei

Presenter: LI, Jiayin (Huazhong University of Science and Technology)

Session Classification: Poster - Industrial/Commercial/Medical Applications and Plasma and Pulse Power Diagnostics

Track Classification: 6.1 Nonequilibrium Plasma Applications