

“Plasma bullets” propagation inside of tissue and agarose tissue model

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Non-thermal plasma jets in open air have been previously shown to be composed of ionization waves commonly known as 'plasma bullets' propagating at high velocities [1,2]. One of the obvious and exciting applications of this type of plasma is treatment of internal organs, for example lung cancer treatment. However, if the conductivity of a tube in which plasma bullets are propagating is relatively large, the plasma formation extinguishes and consequently treatment is impossible. Here we show the possibility of plasma bullet propagation inside of tissues and agarose tissue models with ionic type of conductivity. We study the effects of agar conductivity and tube diameter on length and velocity of propagation, and emission spectra, as well as production of hydrogen peroxide in the agarose gel.

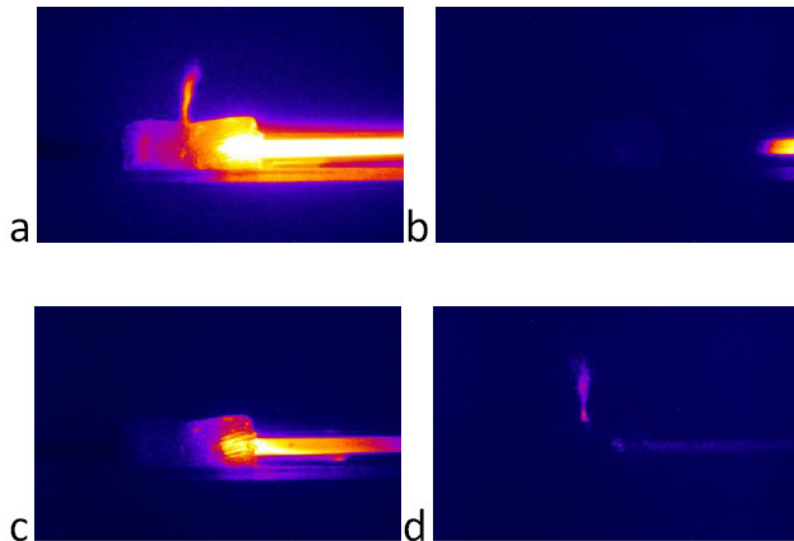


Figure 1: *Plasma bullet propagation in agarose gel with an L-type tube: images taken with a high-speed ICCD camera a) exposure time 20 μ s b-d) exposure time 100 ns, delays b) 0.3 μ s, c) 0.6 μ s, and d) 1.5 μ s.*

References

- [1] Julien Jarrige et al 2010 Plasma Sources Sci. Technol. 19 065005.
- [2] Eric Robert et al. 2009 Plasma Process. Polym. 6 795–802.